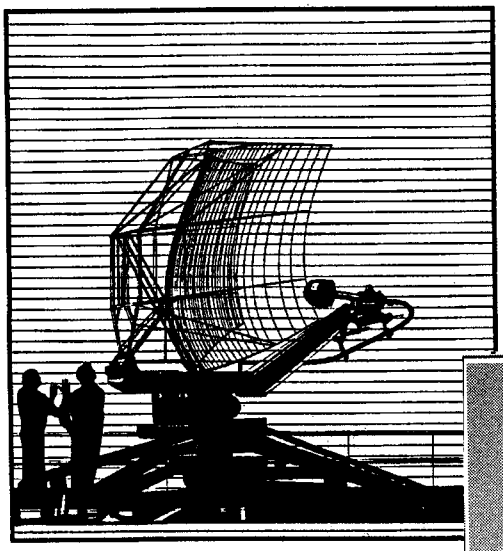
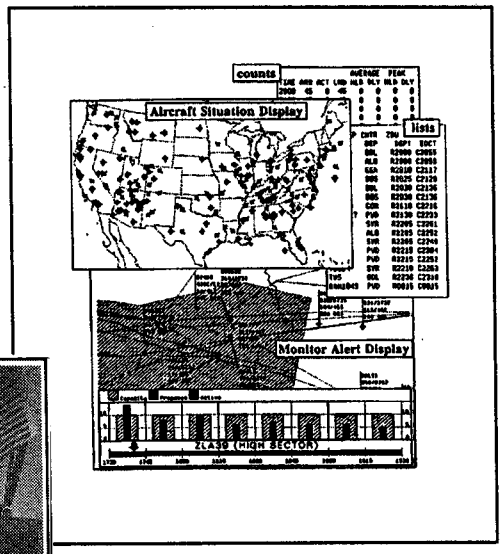
U.S. Department
of Transportation

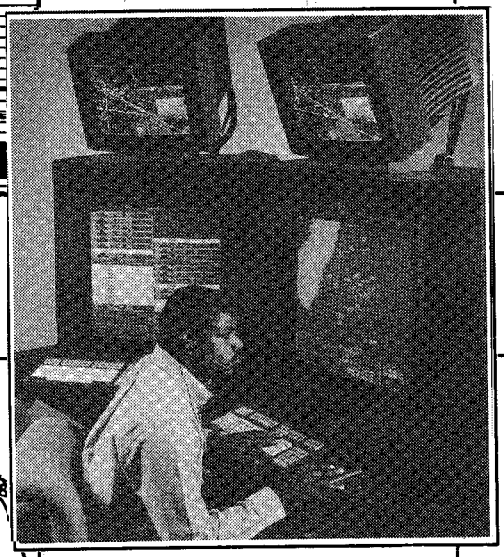
Federal Aviation Administration

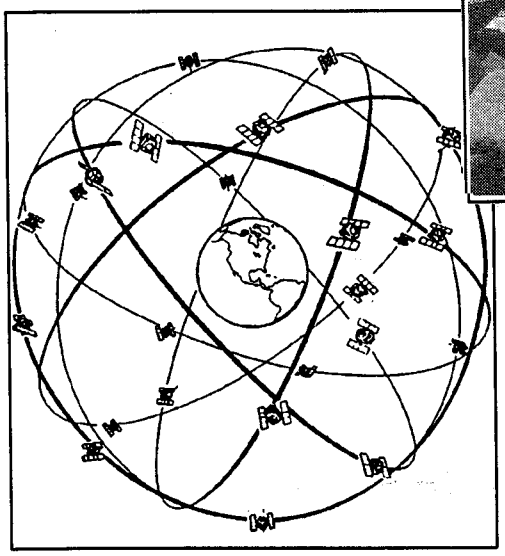
NATIONAL AIRSPACE SYSTEM (NAS)

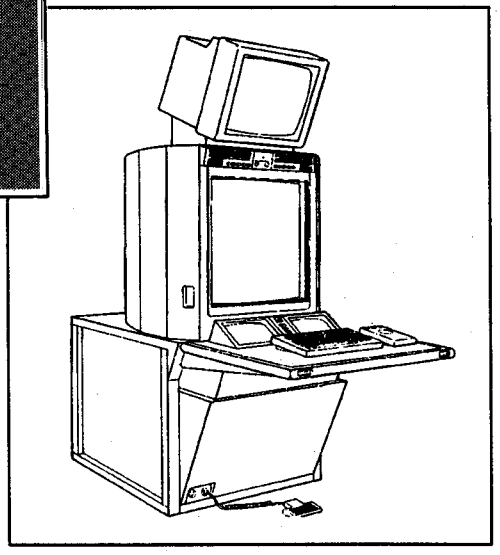
HUMAN RESOURCE MANAGEMENT (HRM) PLAN











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JUNE 1992
Initiated By: AHD–300

U.S. Department of Transportation
Federal Aviation Administration

Memorandum

Subject: INFORMATION: Publication of 1992 NAS Human Resource Management (HRM) Plan

Date: JUL 30 1992

From: Associate Administrator for Human Resource Management

Reply to Attn. of: Cullins:x77295

To: AMT Members

I am pleased to send you the 1992 NAS HRM Plan. This second iteration of the NAS HRMP is a key component of the NAS HRM Program and documents significant progress toward the development of a long-range, integrated strategy to manage the human resource aspects of the NAS modernization.

This plan represents a coordinated effort among Assistant and Associate Administrators for Human Resource Management (AHR), Air Traffic (AAT), and Airway Facilities (AAF), as well as the FAA Technical Center and the FAA Aeronautical Center. The 1992 NAS HRM Plan is a high-level, national look at human resource issues associated with NAS systems which have significance for these work forces.

The 1992 NAS HRM Plan takes the FAA further down the road towards an institutionalized human resource planning process. I want to take this opportunity to thank you and your staff for your support and commitment to this effort. The 1992 NAS HRM Plan is truly a demonstration of corporate collaboration and is a concrete demonstration of our commitment to comprehensive human resource planning.

Raymond B. Herman

Herbert R. McLure

Attachment

FOREWORD

The FAA is committed to comprehensive human resource strategic planning. This is the second edition of the long-range plan for managing the human resource portion of the National Airspace System (NAS) modernization. This plan shows what we have learned about planning processes and approaches since we published the first plan.

We proved the plan's concept in the first edition by examining three major NAS systems and their impact on five work forces. We have expanded the new edition to include all NAS systems considered to significantly impact the human resource management (HRM) of the five work forces through the year 1996. The data we are presenting were obtained by using sophisticated analytical tools and techniques which provide a forecast of the FAA's HRM future. The computer-based analyses and modeling techniques are being continually refined in use by the work forces.

We will address other work forces in future editions of the plan and include additional systems in the analyses. We are committed to continuing and improving our planning process. We want it to ensure orderly, cost-effective, and humane transition of our people to the new systems and technology which help us make the National Airspace a safe, efficient, and reliable national resource.

Barry Lambert Harris
Acting Administrator

INTRODUCTION AND OVERVIEW OF THE NATIONAL AIRSPACE SYSTEM HUMAN RESOURCE MANAGEMENT PROGRAM

This is the second annual National Airspace System (NAS) Human Resource Management (HRM) Plan, developed through a process coordinated among Air Traffic (AT), Airway Facilities (AF), the Federal Aviation Administration (FAA) Aeronautical Center, the FAA Technical Center, and the Assistant Administrator for Human Resource Management (AHR). The scope of the 1991/92 NAS HRM Plan is significantly broader than that of the initial NAS HRM Plan and demonstrates the progress achieved by the FAA in managing the human resource aspects of NAS modernization.

Background

The NAS HRM Program, Project 56-22 in Chapter 5 of the Capital Investment Plan (CIP), was initiated in 1988 to develop a long-range process for managing the human resource aspects of the NAS modernization. The modernization effort described in the CIP includes over 200 projects, some dealing with equipment that has yet to be designed, spanning a 15-year period. The future NAS will also impact staff who must ensure the safety, efficiency, and integrity of current NAS operations while implementing new NAS systems. Furthermore, during this period of significant change, the FAA faces high attrition rates, changing labor demographics, and greater work force diversity. The successful implementation of the NAS modernization depends greatly upon the FAA's ability to manage the impact of new systems on its work force.

NAS HRM Program Objectives

The prime objective of the NAS HRM Program is to develop an integrated, consistent HRM strategy to manage the impacts of NAS modernization. The NAS HRM Program will expand and integrate the line organizations' day-to-day human resource planning to formulate a strategic plan to address transition to and operation and maintenance of future NAS systems.

Scope of the 1991/92 NAS HRM Plan

The 1991/92 NAS HRM Plan examines human resource issues associated with NAS projects that have an impact in the Fiscal Year 1994 - 1996 (FY94-96) time frame. The work forces present additional years of analyses as appropriate. The 1991/92 NAS HRM Plan includes four work forces: the Technical Center, the Aeronautical Center (including the Logistics Center, the Academy, the Maintenance Support Branch, and the Training Systems Section), AF, and AT.

Consistent with all long-range planning efforts, the recommendations contained in the 1991/92 NAS HRM Plan are based on the best and most current information and assumptions available. However, the NAS HRM Plan cannot account for factors such as changes in Congressional direction, major shifts in the budget, or requirements resulting from unexpected events. Data for the NAS HRM Program analyses were current as of the last quarter of FY91.

NAS HRM Planning Approach

The general approach used to produce the 1991/92 NAS HRM Plan, adapted from the uniform planning approach established for the 1990 NAS HRM Plan, was a four step process:

- The NAS HRM Working and Steering Committees established the basic content to be addressed by all organizations;
- Each of the line and support organizations conducted analyses to estimate human resource requirements, project work force availability, and address HRM issues such as training scheduling or pipeline capacity;
- Each work force developed strategies to meet HRM requirements and integrated these strategies into their budget planning process; and
- The information was integrated across organizations to develop the 1991/92 NAS HRM Plan.

FAA Technical Center

The 1991/92 NAS HRM Plan presents Facilities & Equipment (F&E) human resource requirements for CIP systems that impact the FAA Technical Center during FY94-98. Future iterations of the NAS HRM Plan may consider the effect of NAS modernization on Technical Center tenant organizations, as well as organizations/activities funded from other appropriations.

Technical Center human resource requirements peak in FY94 and gradually decline through FY98. The decrease in projected requirements reflects the anticipated progress in implementing the Advanced Automation System (AAS) and Voice Switching and Control System (VSCS), as well as other projects. The Technical Center's plan for meeting the human resource requirements includes the use of additional FAA staff, as well as contractor and overtime support.

The Technical Center has identified increasing the size of its in-house staff as a management action.

FAA Aeronautical Center

Logistics Center

The 1991/92 NAS HRM Plan presents human resource requirements for CIP systems that impact the FAA Logistics Center during FY95-98.

The Logistics Center human resource requirements are dependent upon the supply support and maintenance policy of each individual NAS system. These requirements gradually increase to a peak in FY98. The Logistics Center's plan for meeting human resource requirements is to increase outside hiring.

The Logistics Center has identified a number of management actions. The Logistics Center will:

- Interface the Supportability Database with the HRM modeling effort; and
- Develop a pipeline model specific to Logistics Center needs.

Academy

The 1991/92 NAS HRM Plan presents human resource requirements for CIP systems that impact the AT, Logistics, and Aviation Standards Branches of the FAA Academy in the FY94-98 time frame. The AF Branch is currently re-evaluating its HRM planning process and therefore, could not include detailed system requirements in the 1991/92 NAS HRM Plan.

The Academy human resource requirements gradually increase through FY98. The Academy's plan for meeting human resource requirements is:

- Resource management;
- Additional FAA employees;
- Contract support; and
- Overtime.

The Academy has identified a number of management actions. The Academy will:

- Refine training requirements data and develop improved workload and availability data;
- Develop improved workload estimation methodologies and databases, develop a methodology for mapping training curricula to job tasks, and conduct systematic analyses of training strategies/alternatives;
- Develop/refine a human resource life-cycle costing tool and develop an analytic workload model; and
- Develop the capability to rearrange organizational/position assignments, develop better linkages between the HRM Program and the budget process/cycle, and develop and implement an educational process to support human resource planning processes.

Academy Maintenance Support Branch

The 1991/92 NAS HRM Plan presents human resource requirements for CIP systems that impact the FAA Academy Maintenance Support Branch in the FY94-96 time frame.

The Academy Maintenance Support Branch human resource requirements peak in FY96. The Academy Maintenance Support Branch's plan for meeting human resource requirements is:

- Additional FAA employees; and
- Additional contract support.

The Academy Maintenance Support Branch has identified a number of management actions. The Academy Maintenance Support Branch will:

- Work with the Academy to obtain more accurate estimates of the systems to be maintained;
- Convert the three methods for projecting requirements into a single approved staffing standard; and
- Develop more detailed availability profiles using additional information on gains, losses, and pipeline durations.

Training Systems Section

The FAA Training Systems Section is unable to provide data on human resource requirements for the FY94-96 time frame because it is not yet known what level or type of support the Academy will need. The Training Systems Section projects that human resources above existing levels will be required. Additional resources may be provided from:

- Increased Full Time Equivalent (FTE) levels; and
- Computer hardware/software contractors.

Strategies for the Training Systems Section human resource planning are under development by a team evaluating AT training requirements for the FAA Academy. This team will identify specific tasks, secure proper funding, evaluate maintenance issues, and determine the availability of proper computer skills, and thus lay the ground work for a more meaningful HRM planning process.

AIRWAY FACILITIES

The 1991/92 NAS HRM Plan presents human resource requirements for CIP systems that impact the AF Facilities and Equipment (F&E) and Operations (OPS) in the FY92-96 time frame.

The F&E and OPS human resource requirements increase over the time frame to peak in FY96. AF's plan for meeting F&E human resource requirements is to continue to supplement FAA staffing through the use of the Technical Support Services Contract and other contractor resources. AF's plan for meeting OPS human resource requirements is:

- Increased hiring and training for in-house field personnel;
- Temporary augmentation of the field maintenance personnel to meet short-term needs (including use of the Federal Employees Pay Comparability Act [FEPCA] and journey-level overtime increases);
- Continued augmentation with Original Equipment Manufacturer (OEM) contract maintenance as necessary; and
- Future management initiatives to effect efficiencies in training and workload accomplishment.

AF has identified a number of management actions. AF will:

- Review the results of a job/task analysis and identify implementation strategies;
- Provide improved information to assist the Office of Training and Higher Education (AHT) in planning to meet training requirements;
- Assess how well the standardization of the Regional Project Management System (RPMS) is helping to determine how the standards need to be changed to improve the estimation of workload; and
- Define enhancements to RPMS which will improve its ability to process the various planning networks and to link to other associated databases.

AIR TRAFFIC

The 1991/92 NAS HRM Plan presents human resource requirements for CIP systems that impact AT terminal and en route facilities during FY92-98.

The total AT human resource requirements for terminal and en route facilities peak in FY95 and decrease through FY98. AT's plan for meeting human resource requirements is absorption, overtime, contractor support, and new hires.

FUTURE DIRECTIONS FOR THE NAS HRM PROGRAM

The FAA has identified a number of future directions in order to continue the institutionalization of an ongoing human resource planning process:

- Expand the NAS HRM planning process to include additional FAA work forces impacted by the NAS modernization effort;
- Continue to support FAA organizations in the enhancement and refinement of their HRM planning processes;
- Support the development and refinement of HRM planning models;
- Participate as a member of the Quality Management Board (QMB) for Communications to raise issues with respect to NAS modernization;
- Support efforts to improve data quality and refine analytic models;
- Develop a FAA Human Resource Planning Order and human resource planning data standards;
- Develop links between the HRM planning process and the annual FAA budget planning process;
- Coordinate NAS human resource planning in the line and support organizations with human resource planning activities in the system acquisition community;
- Coordinate and assist with the definition of an FAA-wide human factors process in conjunction with the Human Factors Coordinating Committee (HFCC); and
- Continue to coordinate with the NAS Transition and Implementation Service (ANS) to ensure congruity between national and site specific policies and plans.

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CHAPTER 1: INTRODUCTION TO THE NATIONAL AIRSPACE SYSTEM HUMAN RESOURCE MANAGEMENT PROGRAM

INTRODUCTION

This is the second annual *National Airspace System*[*] (NAS) *Human Resource Management* (HRM) Plan. The 1991/92 NAS HRM Plan presents the results of planning efforts conducted as part of the *Federal Aviation Administration* (FAA) program to develop an institutionalized, integrated process for managing the human resource aspects of the NAS modernization outlined in the FAA *Capital Investment Plan* (CIP). The scope of the current HRM Plan is significantly broader than that of the initial NAS HRM Plan and demonstrates the progress achieved by the FAA in managing the human resource aspects of the NAS implementation.

BACKGROUND

The FAA initiated the NAS HRM Program, Project 56-22 in Chapter 5 of the CIP, in 1988 to develop a long range process for managing the human resource aspects of the NAS modernization. The CIP itself presents a comprehensive plan for the modernization of the NAS and the airport system served by the NAS. The modernization effort described in the CIP includes over 200 projects, some dealing with equipment that has yet to be designed, spanning a 15-year period.

The future NAS incorporates new technologies which change the nature of the jobs for staff who operate and maintain the systems. Transition to the future NAS will also impact staff who must ensure the safety, efficiency, and integrity of current NAS *Operations* (OPS) while implementing new NAS systems. Furthermore, during this period of significant change, the FAA faces high attrition rates, changing labor demographics, and greater work force diversity. The NAS modernization will result in and be impacted by changes in required *Knowledge, Skills, and Abilities* (KSAs), new training programs and technologies, new recruiting programs, potential consolidation plans, and relocation of personnel. The successful implementation of the NAS modernization depends greatly upon the FAA's ability to manage the impact of new systems on its work force.

The demands of the NAS modernization and human resource planning needs are both immediate and strategic. To address these needs, the FAA has undertaken a number of HRM and planning initiatives. Several of these efforts have been incorporated into the NAS HRM Program during the last year. These efforts include: (1) the *Terminal and General NAS* (TAG) Resource Requirements effort (completed *Fiscal Year 1991* [FY91]) which identified human resources needed for the NAS transition in terminal *Air Traffic* (AT) facilities and *General NAS* (GNAS) sector operations, and (2) the *Air Route Traffic Control Center* (ARTCC) Action Plan (completed FY90) which details actions proposed by AT and *Airway Facilities* (AF) to address the human resource requirements of the NAS transition in the ARTCC environment.

Other efforts, such as the AF job task analysis program, are being conducted as independent projects to support organizations participating in the NAS HRM Program. (Chapter 3 provides more detailed

[*] Entries in *italics* are glossary terms.

information on a number of these programs.) In addition, many existing databases and programs designed to deal with day-to-day human resource issues will assist in the transition to and operation of systems in the new environment. The primary objective of the NAS HRM Program is to integrate human resource planning across the agency.

The NAS HRM Program provides the framework within which other human resource planning efforts are coordinated. The first phase of this 3-phase Program was completed in April 1989, with the publication of the **National Airspace System (NAS) Human Resource Management Action Plan (April 1989)** which describes the projects and milestones for development of the initial NAS HRM Plan.

The 1990 NAS HRM Plan, the principal product of phase two of the effort, summarized the analytic process and results of the analyses conducted to develop the initial NAS HRM Plan. The third phase of the NAS HRM Program is the implementation of recommendations contained in the NAS HRM Plan, including the continued refinement, revision, and expansion of the NAS HRM Plan on an annual basis. The 1991/92 NAS HRM Plan is a product of the third phase of the program.

NAS HRM Program Objectives

In addition to developing an integrated, consistent HRM process coordinated across the various segments of the FAA work force such as AT and AF, other objectives of the NAS HRM Program include:

- Identification of estimated training resource requirements, and development and evaluation of alternative training strategies;
- Identification of funding requirements to support the human resource aspects of the NAS modernization;
- Development of planning tools to aid FAA managers in the projection of human resource requirements and examination of the impacts of alternative transition and system design strategies on human resources; and
- Effective communication of NAS HRM Program information to FAA employees in the field and facilitation of input from employees in the field through document review by the *Human Resource Requirements Validation Team* (HRRVT) and field management.

Scope of the 1991/92 NAS HRM Plan

The NAS modernization effort will have a major impact on many of the FAA's work forces. However, the nature of the impact varies considerably from one work force to the next. For example, almost every CIP program involving new equipment impacts the operational requirements of the AF work force, while a much smaller number of programs impact the AT work force. For some organizations, the primary HRM issues associated with NAS modernization will occur during transition, while other organizations will be impacted by changes in future operational requirements. The time frame in which a particular CIP program impacts a specific work force also varies. Consistent with these differences, the range of issues addressed by the 1991/92 NAS HRM Plan varies for each work force. In each case, however, the work forces addressed those issues which have a major impact in the FY94-96 time frame. Future editions of the Plan will include analyses for additional years.

CIP Projects Covered by 1991/92 NAS HRM Plan

The 1990 NAS HRM Plan examined human resource issues associated with the *Initial Sector Suite System* (ISSS), the *Peripheral Adaptor Module Replacement Item* (PAMRI), both part of the *Advanced Automation System* (AAS), and the *Voice Switching and Control System* (VSCS). The 1991/92 NAS HRM Plan has a greatly expanded scope which includes an assessment of the human resource impacts of up to 117 CIP projects for some work forces. Each organization participating in the NAS HRM planning process examined those CIP projects having significant human resource impacts on its work force during the FY94-96 time frame. The number of projects addressed by each organization ranged from 15 for AT to 117 for AF. Appendix A provides a complete list of CIP projects addressed by each organization. In addition to CIP projects, the FAA Aeronautical Center chapter also includes an examination of human resource requirements for non-CIP projects related to NAS modernization, such as the *Automated Radar Terminal System* (ARTS)-IIIA upgrade and requirements to train the military services on new equipment.

Work Forces Covered by 1991/92 NAS HRM Plan

The 1991/92 NAS HRM Plan addresses HRM issues for the FAA Technical Center, the FAA Aeronautical Center, the AF work force, and the AT work force. The FAA Technical Center analyses include the entire Technical Center, exclusive of the AT and AF tenant organizations.

The Aeronautical Center's chapter of the 1991/92 NAS HRM Plan consists primarily of transition requirements for the FAA Logistics Center and most of the FAA Academy, the two organizations most affected by the NAS modernization. Both of these organizations were examined in the 1990 NAS HRM Plan. However, two other organizational units at the Aeronautical Center also provide direct support to the FAA Academy in their mission of providing agency-wide technical training. The Academy Maintenance Support Branch of the Facility Support Division provides periodic and on-call service, calibration, and modification of the various AF and AT systems used for training at the FAA Academy. The Training Systems Section of the Data Services Division provides systems analysis and design, operations, software development and maintenance, and project management for AT simulation systems used for *Air Traffic Control Specialist* (ATCS) training. Therefore, in order to provide a complete picture of human resource needs required to accomplish the technical training of AF and AT personnel, the Academy Maintenance Support Branch and the Training Systems Section have been included in the 1991/92 Aeronautical Center NAS HRM analyses. The Aeronautical Center analyses do not include the AF tenant organizations.

For AT and AF, the HRM analyses include both the ARTCC and Terminal GNAS work forces. However, neither AT nor AF tenant organizations at the Technical Center or Aeronautical Center are included in the AT and AF analyses.

NAS HRM Planning Approach

During 1991, the uniform planning approach used to produce the 1990 NAS HRM Plan was adopted and tailored to the requirements of each individual organization participating in the NAS HRM Program. The general approach used to produce the 1991/92 NAS HRM Plan was a four step process:

- First, the NAS HRM Working and Steering Committees established the basic content and common assumptions to be addressed by all organizations participating in the NAS HRM planning process.

- Each of the line and support organizations then conducted the analyses required to estimate human resource requirements, project work force availability, and address essential HRM issues such as scheduling of training or pipeline capacity.

- The third step involved the development of strategies by each work force to meet HRM requirements and integration of these strategies into the budget planning process.

- The fourth and final step in the process was the integration of this information across organizations and the development of the 1991/92 NAS HRM Plan.

The common assumptions and definitions used in the 1991/92 NAS HRM Plan are addressed in Chapter 2. Detailed discussions of the specific NAS HRM planning process and the HRM strategies developed by each organization are contained in Chapters 4 through 7.

The NAS HRM Plan documents individual organizations' progress in human resource planning for NAS implementation and should be viewed **as a living document. It is important to note that, consistent with all long-range planning efforts, the recommendations contained in the NAS HRM Plan are based upon the best and most current information and assumptions available.** However, the NAS HRM Plan cannot account for factors such as changes in Congressional direction, major shifts in the budget, or unplanned requirements resulting from unexpected events. As new information and data are obtained, the requirements estimates presented in this document, as well as all other analyses, will be subject to revision. The NAS HRM Plan is a national level document; the numbers are presented for informational purposes and are not detailed enough for regional staffing planning, etc. The information in the 1991/92 NAS HRM Plan was developed through a planning process designed to ensure compatibility with the FAA budget process; the 1991/92 NAS HRM Plan presents justifications for the human resource requirements portion of the budget, just as the CIP justifies equipment requirements.

NAS HRM Program Management

NAS HRM Program

The NAS HRM Program is located within the *HRM Planning and Research Division* (AHD-300), which is in the *Office of Human Resource Development* (AHD-1), under the *Assistant Administrator for Human Resource Management* (AHR-1). The NAS HRM Program Manager is responsible for the development and implementation of an agency-wide planning process to address the impacts of NAS modernization on FAA human resources. The 1991/92 NAS HRM Plan was developed through a process guided by the NAS HRM Steering Committee. Chapter 3 describes the relationship between the NAS HRM Program planning process and other HRM planning efforts ongoing within the FAA.

Oversight Committees

In 1989 the *Executive Director for Administration and Resource Management* (AXA-1); *Executive Director for Regulatory Standards and Compliance* (AXR-1); *Executive Director for System Development* (AXD-1); and *Executive Director for System Operations* (AXO-1) jointly chartered two committees to provide management input, participation, and decision making to the NAS HRM Program. The NAS Human Resource Management Action Plan (April 1989) details the composition of the two committees, and their respective duties and responsibilities. Current organizational counterparts continue to support the NAS HRM Program.

The NAS HRM Steering Committee, at the service level, provides guidance and direction to the NAS HRM Working Committee. The Steering Committee acts as the decision body to resolve issues, establish priorities, and endorse recommendations.

The NAS HRM Working Committee, at the division level, ensures that each organization carries out the activities previously agreed upon by the Steering Committee. The NAS HRM Working Committee serves as the liaison between the Steering Committee and represented functional organizations, identifies policy level issues and develops recommendations, coordinates issues among organizations, and reviews and endorses inputs to the NAS HRM Plan. Appendix C lists members of the Steering and Working Committees.

Field Input

The NAS HRM Steering Committee chartered the HRRVT in April 1990 to provide for reviews, comments, and recommendations by individuals with a field perspective. The HRRVT is comprised primarily of field technical and administrative employees, including union representatives, involved in NAS modernization. Members of the HRRVT are listed in Appendix C.

ORGANIZATION OF THE NAS HRM PLAN

Chapter 2 provides an overview of the common assumptions, FAA requirements, and HRM impacts of those portions of the NAS modernization effort addressed by the 1991/92 NAS HRM Plan.

Chapter 3 provides a description of the progress made by the FAA toward developing an integrated HRM planning process since publication of the 1990 NAS HRM Plan. This chapter addresses progress in the development of analytic methodologies, databases, communication strategies, and organizational action plans. It also describes the 1991/92 NAS HRM Plan's integration and coordination with other FAA planning efforts.

Chapters 4 through 7 present the results of the NAS HRM analyses and an overview of the HRM process for the FAA Technical Center, the FAA Aeronautical Center, AF, and AT, respectively. These chapters address organization-specific human resource issues such as human resource requirements, projected availability, and plans for meeting requirements. Chapter 8 summarizes the current state of human resource planning for NAS modernization across organizations, and outlines future directions for the NAS HRM Program.

Appendix A provides a list of CIP projects addressed by each organization in the 1991/92 NAS HRM Plan. Appendix B provides supporting information for the results of analyses reported in other chapters of the NAS HRM Plan. Appendix C lists members of the NAS HRM Steering Committee, Working Committee, and the HRRVT. A glossary, which includes acronyms, terms and CIP projects, and a topic index are also presented at the end of the document.

A comment form has been provided at the end of the 1991/92 NAS HRM Plan to solicit your input.

CHAPTER 2: OVERVIEW OF FAA HUMAN RESOURCE IMPACTS

INTRODUCTION

The purpose of this chapter of the NAS HRM Plan is to provide an overview of the common definitions and assumptions used in conducting analyses for the 1991/92 NAS HRM Plan as well as an overview of the results of these analyses. The chapter begins with a brief description of the roles or functions that each work force included in the 1991/92 NAS HRM Plan plays in the NAS modernization effort. Following this discussion is a definition of HRM impacts as used in the context of the NAS HRM Program. The next section outlines common assumptions used in NAS HRM analyses. The final sections of the chapter describe the scope of the modernization program addressed by the 1991/92 NAS HRM Plan and an overview of the impact of this modernization effort on the FAA work forces included in this document.

ORGANIZATIONAL ROLES IN NAS MODERNIZATION

Successful NAS modernization requires the expertise and effort of a large number of FAA organizations as well as considerable coordination of activities within and between these elements. This section summarizes the NAS modernization roles of the FAA organizations included in the 1991/92 NAS HRM Plan.

FAA Technical Center

The FAA Technical Center plays a key role in the NAS modernization effort by installing and testing equipment at the Technical Center, thus providing a test environment for new NAS systems. The Engineering, Test, and Evaluation Service at the Technical Center also identifies test and verification requirements for major systems, develops project test plans, supports program offices in the monitoring of contractor test and verification activities, and plans and conducts tests and evaluations of systems.

FAA Aeronautical Center

Two principal components of the FAA Aeronautical Center, the FAA Academy and the FAA Logistics Center, support the NAS modernization effort. FAA Academy resources are required for developing and revising curricula materials for the training of AF and AT personnel in the operation and maintenance of new equipment and software. The Academy also represents the primary location for centralized developmental and transition training of FAA personnel.

The FAA Logistics Center plays both a logistics support and repair role for new equipment entering the FAA inventory. The Logistics Center plans, catalogs, implements, and supplies the equipment necessary for ongoing operations and maintenance of the new NAS systems. The Logistics Center will also provide repair services for selected new NAS systems.

Airway Facilities

The AF organization has a wide range of responsibilities and roles in the NAS modernization effort. Components of the AF Service at FAA Headquarters:

- Participate in the development of system operations and maintenance concepts for new systems;
- Review system documentation and implementation plans to ensure that they meet AF requirements;
- Develop and revise operations/maintenance procedures and maintenance schedules for new systems;
- Develop national standards and guidelines for maintenance and implementation planning;
- Participate in all aspects of human resource planning including planning for transition training; and
- Provide oversight for implementation planning, integrated logistics support, and facility configuration management.

AF personnel funded under the *Facilities and Equipment* (F&E) appropriation have field responsibility for formulating regional NAS implementation programs in coordination with NAS Program Offices. These individuals also have responsibility for preparing for implementation readiness through facility modernization efforts, site preparation, and coordination of training for AF personnel. As systems are delivered, these personnel are responsible for equipment installation and system verification and acceptance.

The AF work force in sector offices in the field is funded through the OPS appropriation and plays a different role in NAS modernization. This work force reviews and provides input to regional F&E planning processes to ensure that plans are consistent with operational and safety requirements. These personnel also participate in *Operational Test and Evaluation* (OT&E) activities at the FAA Technical Center and in operational shakedown tests of new systems at affected facilities. The field AF personnel oversee all installation testing activities to ensure that the integrity of the existing NAS system is not degraded during the transition to the new system. These field personnel receive extensive classroom and on-the-job training on the operation and maintenance of new systems prior to their commissioning. After commissioning, these individuals will operate and maintain the new systems.

Air Traffic

The roles played by AT in NAS modernization involve headquarters, regional, and facility level personnel in the AT service. AT headquarters organizations:

- Identify *Air Traffic Control* (ATC) operational requirements;
- Review system documentation and implementation planning to ensure they meet ATC operational requirements;

- Determine AT staffing and training requirements and develop national level implementation strategies;

- Coordinate with affected bargaining units as appropriate; and

- Develop or revise operational procedures for new systems.

At the regional level, AT personnel coordinate the review of systems requirements and provide input into system development and implementation planning through the AT headquarters elements. These regional organizations also coordinate the provision of facility personnel for participation in national planning teams, OT&E of new systems, and implementation training.

AT facility personnel participate in ATCS teams overseeing systems development and in OT&E efforts at the FAA Technical Center. They also monitor the on-site installation and integration test and verification activities for new systems. These facility personnel receive classroom, simulation laboratory, and on-the-job training in the use of new equipment and new procedures resulting from the implementation of new systems.

FAA Definition of NAS HRM Impacts

The HRM impacts of NAS modernization include any change in human resources beyond those necessary to operate and maintain the existing ATC system. As a result of the introduction of new NAS systems, equipment, software, or other modernization programs, human resources will be required to:

- Develop plans;
- Manage procurement;
- Install equipment/software;
- Test equipment or procedures;
- Train FAA personnel;
- Prepare and validate new operational procedures;
- Develop proficiency in the use or maintenance of new systems;
- Operate new systems;
- Maintain new systems; or
- Consolidate personnel.

1991/92 NAS HRM Plan Assumptions

The planning efforts conducted by each of the FAA work forces to support the 1991/92 NAS HRM Plan were based upon a number of assumptions. Given the unique missions and substantial differences in the manner in which the CIP projects impact the work forces of each organization, many of these assumptions were unique to each organization's human resource planning process. These unique assumptions are addressed within the respective chapters for each line or support organization included in the 1991/92 NAS HRM Plan. Certain common assumptions were, however, adopted by the NAS HRM Steering Committee to ensure consistency across the human resource planning efforts and to facilitate integration of the results. Four principal assumptions which were consistently used in development of the 1991/92 NAS HRM Plan are described below:

- First, to the extent possible, all organizations used "official" sources for project schedules for CIP programs, such as the delivery dates contained in the *Master Delivery Forecast Module* (MDFM). Delivery date information used to support NAS HRM analyses was current as of the fourth quarter of FY91.

- The second common assumption used in the 1991/92 NAS HRM Plan is that all human resource requirements will be expressed in terms of *Full Time Equivalents* (FTEs). The exact number of labor hours or *Productive Labor Days* (PLDs) included in an FTE varies by each work force. FTEs were defined by each work force as follows:

Technical Center:	1,872 productive labor hours
Aeronautical Center	
Logistics Center:	1,744 productive labor hours
Academy	
AT Branch:	1,770 productive labor hours
AF Branch:	1,770 productive labor hours
Maintenance Support Branch:	1,744 productive labor hours
Training Systems Section:	N/A
Airway Facilities:	1,770 productive labor hours for OPS, 1,792 productive labor hours for F&E
Air Traffic:	Compensable hours in accordance with *Office of Management and Budget* (OMB) Circular A-11.

- The third common assumption used in the 1991/92 NAS HRM Plan is that human resource requirements and availability analyses would be conducted for the FY94-96 time frame. Each organization provided requirements estimates consistent with this assumption. A number of the organizations provided requirements estimates for additional years as appropriate for their HRM planning needs. Requirements of all organizations presented for FY94 are predicated on the receipt of budget to support requirements in FY92 and FY93.

- Finally, as appropriate, each organization included human resource impacts resulting from the transition to and operation and maintenance of CIP projects within the NAS in the FY94-96 time frame in the NAS HRM planning process. In addition to this common denominator, the different organizations included other human resource requirements related to NAS modernization in their respective chapters. These other requirements included estimates such as non-CIP projects impacting the FAA Academy.

MODERNIZATION PROGRAMS ADDRESSED BY THE 1991/92 NAS HRM PLAN

A large number of CIP projects will impact the work forces included in the 1991/92 NAS HRM Plan during the FY94-96 time frame. Appendix A provides a summary of CIP projects addressed by each of the work forces. The nature of the CIP projects addressed by the 1991/92 NAS HRM Plan range from small systems such as the *Automated Weather Observing System* (AWOS) to major facility consolidation programs such as the *Area Control Facility* (ACF) program. Some projects such as ISSS and VSCS are addressed by all of the work forces. Other projects such as *Runway Visual Range* (RVR) were addressed

by only one or two work forces. Even when a CIP project impacts a number of the work forces, the nature, magnitude, and timing of the human resource issues associated with the modernization project may vary considerably by work force. Therefore, descriptions of the CIP projects which have the most important human resource impacts on each work force are contained in the respective chapters for each of the four organizations included in the 1991/92 NAS HRM Plan.

Overview of NAS HRM Impacts on Work Forces Included in the 1991/92 NAS HRM Plan

The requirements presented in the 1991/92 NAS HRM Plan vary greatly across the organizations over the FY94-96 time frame. The peak requirements for each organization occur at different points in time. The FAA Technical Center experiences its peak requirements in FY94. This reflects the mission of this organization to test and accept delivery of new systems prior to delivery of the systems at the AF and AT facility level organizations. The peak requirements for the Aeronautical Center, AF, and AT occur in the FY95-96 time frame and beyond. It is during this period that the Aeronautical Center will prepare and provide logistical support and transition training for many of the new systems, and the operational and maintenance personnel in AF and AT will receive transition training and assist with the implementation of many of the CIP projects included in the 1991/92 NAS HRM Plan.

More detailed discussions of human resource requirements and issues associated with CIP implementation and NAS modernization are provided in each of the line and support organizations' respective chapters. These chapters also contain (where appropriate) estimates of personnel availability to meet requirements resulting from CIP projects, each organization's strategies for meeting the human resource requirements identified in the 1991/92 NAS HRM Plan, and action plans for refining each HRM planning process.

CHAPTER 3: PROGRESS IN DEVELOPING AN INTEGRATED FAA NAS HRM PLANNING PROCESS

INTRODUCTION

One of the principal objectives of the NAS HRM Program is to institutionalize an ongoing, integrated human resource planning process for NAS modernization efforts. Progress has been made in achieving this objective since the publication of the first NAS HRM Plan, including:

- Refinement and enhancement of line and support organization HRM planning processes;
- Integration of HRM planning efforts into the NAS HRM Program;
- Development and refinement of HRM planning models;
- Development of a programmatic, rather than system specific, planning approach with greater integration of HRM and budget planning efforts;
- Linkage of NAS HRM planning with other FAA planning efforts;
- Assessment of the effectiveness of FAA communication processes supporting the CIP; and
- Development of a NAS HRM planning road map and organizational action plans.

This chapter of the NAS HRM Plan provides an overview of the progress made in each of these areas. Future directions of effort in each of these areas are presented in Chapter 8.

REFINEMENT AND ENHANCEMENT OF LINE AND SUPPORT ORGANIZATION HRM PLANNING PROCESSES

Since the publication of the 1990 NAS HRM Plan, the organizations participating in the NAS HRM Program have made substantial enhancements to their respective HRM planning processes. Both AT and AF have worked with AHD and other organizations to develop future HRM planning processes. Both organizations have begun programs to develop the analytic models and databases required to support this future planning process while continuing to conduct HRM analyses using the best available tools and data. In a similar vein, the FAA Technical Center has continued development of analytic tools to examine human resource requirements and develop preliminary cost estimates of strategies to meet these requirements.

The FAA Aeronautical Center has also made significant progress in refining and enhancing its human resource planning process for the 1991/92 NAS HRM Plan. For instance, the FAA Logistics Center has developed a database to support the projection of HRM requirements. The FAA Academy has initiated a long range planning process to identify non-student workload. The Aeronautical Center has further

automated its planning process and expanded the scope of the process to include additional Aeronautical Center organizations and additional modernization projects.

Across the organizations, one of the greatest challenges to enhancing the HRM planning efforts is the improvement in databases and tools used to project future availability of personnel. AHD and the line and support organizations have identified this as a future action necessary for continued support to the line and support organizations.

DEVELOPMENT AND REFINEMENT OF HRM PLANNING MODELS

In conjunction with the enhancement of line and support organization HRM planning processes, AHD has supported continued development and refinement of the prototype planning models developed to support the 1990 NAS HRM Plan. The prototype models developed to support early planning efforts have been converted into an integrated software system with a common user interface. These efforts have been most closely coordinated with the enhancement of an integrated AF planning process and include refining and enhancing the staffing requirements, availability, and training resource scheduling tools. These refinements will ease the adaptation of HRM planning models to various work forces to be incorporated in future iterations of the NAS HRM Plan. In addition, AHD has supported efforts to enhance the Logistics Center's Supportability Database, and the *Systems Engineering and Integration Contractor* (SEIC) has been developing and refining tools to augment AT's human resource planning process.

In addition to the refinement of early prototype models, progress in the area of HRM planning models includes the development of new databases and analytic programs related to work force availability as part of a joint AHD and AF program called the *Staffing and Training Analysis Requirements System* (STARS). Efforts are also underway to develop a flexible automated human resource strategy development and costing model.

At this point, the primary focus of the NAS HRM modeling effort remains the development of tools supporting national level, integrated human resource planning. However, the program has also identified the need and specific requirements for development of site-level planning tools. These issues are addressed in the discussion of future directions of the NAS HRM Program in Chapter 8.

DEVELOPMENT OF A PROGRAMMATIC HRM PLANNING APPROACH

The initial 1990 NAS HRM Plan addressed three major systems in the NAS modernization program which had significant impacts in the ARTCC environment. The focus on specific major systems in the NAS modernization program was useful as a proof of concept of the NAS HRM planning approach. The 1991/92 NAS HRM Plan more clearly reflects the objective of the NAS HRM Program, the development and implementation of a programmatic approach to human resource planning supporting NAS modernization. To this end, the 1991/92 NAS HRM Plan focuses on overall work force impacts of NAS modernization rather than specific system requirements. This planning approach is more consistent with budget planning requirements and is a major step forward in the integration of NAS HRM planning into the budget planning process.

DEVELOPMENT OF A NAS HRM COMMUNICATION STRATEGY

One of the requirements identified in the earliest stages of the NAS HRM Program was the development of an integrated and comprehensive NAS HRM communication strategy. Since the development of the 1990 NAS HRM Plan, the NAS HRM Program has been charged with the task of assessing the degree to which the FAA is successfully communicating information about development and deployment of CIP systems.

The assessment of the FAA's communications processes which support the CIP was implemented as part of a CIP project (Project 56-22). As part of this project, the NAS HRM Program completed a 10 month review of the FAA's internal communications initiatives related to CIP projects. Recommendations and findings are documented in the **FAA Internal Communications Assessment** (July 1991).

DEVELOPMENT OF A NAS HRM PROGRAM ROAD MAP AND HRM PLANNING ORDER

Ultimately, an FAA HRM Planning Order and HRM planning data standards will be developed as part of the NAS HRM Program. To support these goals, several projects have been initiated or completed since publication of the 1990 NAS HRM Plan. One effort recently completed was the program priorities project, which identified general actions required to enhance the line and support organizations' HRM planning processes as well as the overall NAS HRM Program. A second effort in this area is the development of a NAS HRM planning road map. The road map project is designed to capture and document the existing HRM planning processes in the FAA, diagram and document the desired process for the future, and outline steps required to achieve the future planning process.

The later phases of the road map project will focus on the development of an FAA Human Resource Planning order. The order will outline the FAA human resource planning process, clarify the human resource structure, identify organizational responsibilities, define linkages to other FAA planning efforts, and begin to establish human resource planning data standards.

RELATIONSHIPS TO OTHER FAA PLANNING EFFORTS

Integration of HRM Planning Efforts into the NAS HRM Program

The 1990 NAS HRM Plan described a number of ongoing HRM planning efforts requiring coordination and integration. A number of these efforts including the TAG, ARTCC Action Plan, and communication assessment have been incorporated into the NAS HRM Program. The integration of these efforts under the umbrella of a single program is a major step forward in development of an integrated NAS HRM planning program. The NAS HRM Program will integrate the results of other programs, such as the AF *Job Task Analysis* (JTA), as appropriate.

Linkage of NAS HRM Planning with Other FAA Planning Efforts

The institutionalization of the NAS HRM planning process is in large part dependent upon the integration of the HRM planning process with other major FAA planning efforts. The NAS HRM Program has made progress in coordinating the HRM planning efforts with FAA budget planning, system acquisition programs, and the emerging FAA human factors planning efforts.

A primary focus pursued by the NAS HRM Program has been coordination with the FAA budget planning process. Progress in this area includes synchronization of the HRM planning cycle with the budget planning cycle.

Linkages with the system acquisition community have been established since publication of the 1990 NAS HRM Plan. Efforts in this area include a coordinated program among the *NAS System Engineering Service* (ASE), *Advanced Automation* (AAP), and *Air Traffic Plans and Requirements Service* (ATR) to identify requirements and implement programs to improve AT workload models and data. In the future, the NAS HRM Program will coordinate with the *National Airspace Integrated Logistics Support* (NAILS) Program.

After the NAS HRM Program was initiated, the FAA established a program to facilitate the integration and expansion of a major human factors research program within the FAA. The NAS HRM Program actively maintains involvement with and is represented on the FAA's *Human Factors Coordinating Committee* (HFCC) which coordinates the FAA's human factors program. This committee is tasked with the development of an integrated FAA Human Factors Plan. Within the HFCC, the NAS HRM Program representative acts to further develop a logical system for the acquisition, management, and application of human factors research data for all new and planned systems.

The NAS HRM Program is currently assisting with the definition of an FAA-wide human factors process in conjunction with the HFCC. Recently the NAS HRM Program added a full-time human factors psychologist to its ranks to devote more resources to the development of this effort and to assist in the development of orders and standards for the institutionalization of human factors research, as it applies to staffing and training, into the acquisition and development of new systems.

Coordination with Other FAA HRM Planning Efforts

This section presents some of the human resource programs that must be coordinated and integrated with the NAS HRM Program. A number of these programs are sponsored by individual line and support or staff organizations and may potentially be expanded to other FAA organizations. The following discussion highlights representative programs in different areas.

Human Resource Requirements

The AF JTA, a joint AHR and the *Maintenance Operations Division* (ASM-200) undertaking, takes a comprehensive look at the tasks and skills required to support current systems and project the skills required for future systems. This JTA has only recently been completed and the application of its results to HRM planning for NAS modernization is under active study by both AF and AHR. The results are expected to provide an important source of data for developing the skill profiles for future AF technicians.

A variety of teams, sponsored by the line and support organizations, ensure field input in the design and implementation planning phases of NAS projects. The Automated En Route Air Traffic Control Concepts Team, for example, researches and develops ATC concepts, using large-scale automated systems to

enhance the AAS, so that it meets future operational requirements. The *AF Transition Requirements Verification Team* (AFTRVT) and the *AT Transition Requirements Verification Team* (ATTRVT) develop, review, and verify operating and/or engineering and maintenance requirements to ensure that AAS planned implementation meets AF and AT objectives to support uninterrupted ATC services.

Human Resource Availability/Supply

The Pay Demonstration Project, which provides quarterly allowances of up to 20 percent of base pay for approximately 2,100 AT, AF, and *Flight Standards* (FS) personnel at selected hard-to-staff sites, has now been underway for approximately 2 years. The *Office of Personnel Management* (OPM) and the FAA are jointly evaluating the effect of these allowances on the ability to attract and retain qualified employees to work at these sites. Initial indications are that the allowances have had a marked effect. The selected sites are, however, within geographical areas where the newly enacted Government-wide pay legislation is likely to provide pay differentials which may affect the allowances provided under the demonstration project. The effect of this replacement (with rates sometimes different from the demonstration rates) remains to be seen.

The *Modular Applicant Testing, Examining and Screening* (MATES) program has reduced the hiring process for new ATCSs from 6-18 months to 45-60 days, greatly improving the FAA's ability to attract highly qualified candidates. A similar effect has occurred with the application of MATES to aviation safety inspector hiring.

The FAA is developing a new process for greatly reducing the screening time for potential ATCS trainees from the present 9 weeks to approximately 1 week at the FAA Academy. This process, called the Pre-Training Screen, if successful, will allow many applicants the opportunity to be screened by the FAA, while on leave from their previous employment, and to find out whether or not they will be retained by the FAA without having to give up their previous jobs. It is an interim process which will be replaced in 1994-95 with a screening process called the *Separation and Control Hiring Assessment* (SACHA), now in the initial stages of development.

MATES, the Pre-Training Screen, and SACHA are designed to reduce time in the training pipeline, permit improved targeted recruiting efforts, and save hiring and training dollars.

The Flight Plan for Training, launched in FY89, consists of eight initiatives to improve recruitment, hiring, and training of employees in safety-related occupations and improve the skill development of managers and supervisors. Several of the initiatives speed up the human resource pipeline, providing a wider range of possibilities for planning for transition staffing. Others increase the pool of highly qualified applicants.

In a climate of increasing demands for skilled, but scarce resources, the FAA requires a corps of high-potential managers and executives capable of dealing effectively with major managerial challenges. The *Supervisory Identification and Development Program* (SIDP), the AT and AF *Managerial Selection System* (MSS), and the *Senior Executive Service* (SES) *Candidate Development Program* (CDP) contribute to development of a strong cadre of managers and executives prepared to support the NAS modernization. The SIDP identifies and develops candidates for first-level supervisory positions. The MSSs identify supervisors who have the potential for becoming high quality facility and branch-level managers. The SES CDP identifies talented managers for the FAA's SES, linking an intensive selection process with an individualized, in-depth development phase.

Human Resource Policies and Plans

The development of various policies and plans at all organizational levels reflects the FAA's efforts to support the NAS modernization. AT's ACF Human Resource Plan will be a guide for managing human resources during facility consolidation, including communications and marketing plans. The Aeronautical Center Transition Plan coordinates the Aeronautical Center's efforts to support NAS transition. In addition, virtually every region has identified regional issues resulting from NAS modernization and has developed or is developing human resource plans.

At the FAA Headquarters level, the NAILS Program aims to eliminate duplication, reduce acquisition and life cycle costs, and improve the integration of system support and operability elements in the NAS modernization. Similarly, Draft FAA Orders 6000.27A and 6000.30B describe the concept for maintenance of the NAS by the FAA's AF organization.

The NAS HRM Program provides the conceptual and analytic framework for coordinating and integrating human resource policies and plans at all organizational levels nationwide.

Communications

In addition to the communications assessment undertaken as part of the NAS HRM Program, other communications efforts supporting NAS modernization are underway.

Effective programs fostering collaborative relationships with national labor unions will facilitate implementation of the NAS modernization and the accompanying cultural change. The Employee Involvement Process, for example, was developed jointly by FAA management and the *Professional Airways Systems Specialists* (PASS) to improve labor/management relationships. In a similar vein, the 3-day "Partners in Problem Solving" course is given to AT managers and *National Air Traffic Controllers Association* (NATCA) representatives.

A well-established employee survey program provides the agency with an opportunity to assess whether the NAS HRM planning process is accomplishing its objectives. The *Job Satisfaction Survey* (JSS), administered every other year to a random sample of employees, and the *Survey Feedback Action* (SFA) Plan, given annually to all employees, generates individual supervisory action plans which become the basis for collaborative efforts and problem solving between supervisors and their subordinates.

SUMMARY

The 1990 NAS HRM Plan established a foundation for an ongoing, integrated, long-range human resource planning process. Since the publication of that initial plan, significant progress has been made in the development of an integrated planning process. The more comprehensive NAS HRM impacts addressed by the line and support organizations in their respective chapters reflect this progress and the increased emphasis by these organizations on long-range HRM planning.

CHAPTER 4: FAA TECHNICAL CENTER

INTRODUCTION AND SCOPE

The FAA Technical Center has responsibility for the research, development, and testing of new hardware, software, and operational procedures for CIP systems. This activity is a direct extension of the Technical Center's historical role in the translation of field operational requirements and new program initiatives into working systems. The Technical Center also provides ongoing software maintenance and standardization for operational systems and hardware troubleshooting. With respect to the CIP, the Technical Center staff, including tenant organizations, works closely with contractors to design and build systems for the future NAS. The Technical Center will also provide training for initial sites receiving AAS and VSCS systems.

While the Technical Center's 1990 NAS HRM Plan focused on human resource requirements for only three CIP systems (ISSS, PAMRI, and VSCS), the 1991/92 NAS HRM Plan includes all F&E human resource requirements for all CIP systems that impact the Technical Center during FY94-98. The scope of requirements addressed in this plan excludes the AT and AF tenant organizations and activities funded from other appropriations.

BACKGROUND

The NAS modernization, documented in the CIP, includes over 200 projects covering a 15-year period. Some of these projects deal with equipment that has yet to be designed and built. The 1991/92 NAS HRM Plan presents the Technical Center F&E requirements for all CIP projects with impacts in the FY94-98 time frame. Future iterations of the NAS HRM Plan may consider the effect of the NAS modernization on Technical Center tenant organizations, as well as organizations/activities funded from other appropriations.

OVERVIEW OF PLANNING PROCESS INTEGRATION

The first stage in the human resource planning process is the development of a *Program Directive* (PD) for each CIP project. The PD is developed jointly by the Program Manager and the Technical Center *Associate Program Manager for Test* (APMT) using guidance from the latest version of FAA Order 1810.4, FAA NAS Test and Evaluation Policy, and personal experience and judgment. Order 1810.4 establishes broad guidelines for the administration of test and evaluation activities and outlines specific Technical Center test and evaluation milestones. PDs cover a 3 to 5 fiscal year period and outline the specific test and evaluation levels of effort for each fiscal year, including human resource requirements, equipment requirements, documentation, cost and schedule controls, and funding requirements.

The CIP projects supported by Center organizations form the basis of the F&E budget request. Manpower requirements are derived from the *Level of Effort* (LOE) required to meet project milestones. These levels are determined by the APMT's knowledge and experience of the CIP projects. These requirements are summarized and forwarded to the *Office of Budget* (ABU) in the Center's annual budget.

The PD information feeds into staffing analyses where authorized requirements are assessed in light of projected in-house availability (e.g., by skill, grade, specialty, etc.). Using this information, combined with experience and judgment, an appropriate mix of FAA, overtime and contractor support is determined. This result feeds into the *Cost Schedule Control System* (CSCS) for monitoring and reporting, as well as strategy costing purposes. A detailed inventory of the in-house staffing for the current fiscal year and a 4-year summary projection of human resource requirements is maintained in CSCS. Seven major cost components in CSCS support what-if analyses, including allocation trade-offs between contractor and in-house staffing.

Figure 4-1 outlines the Technical Center's human resource planning process.

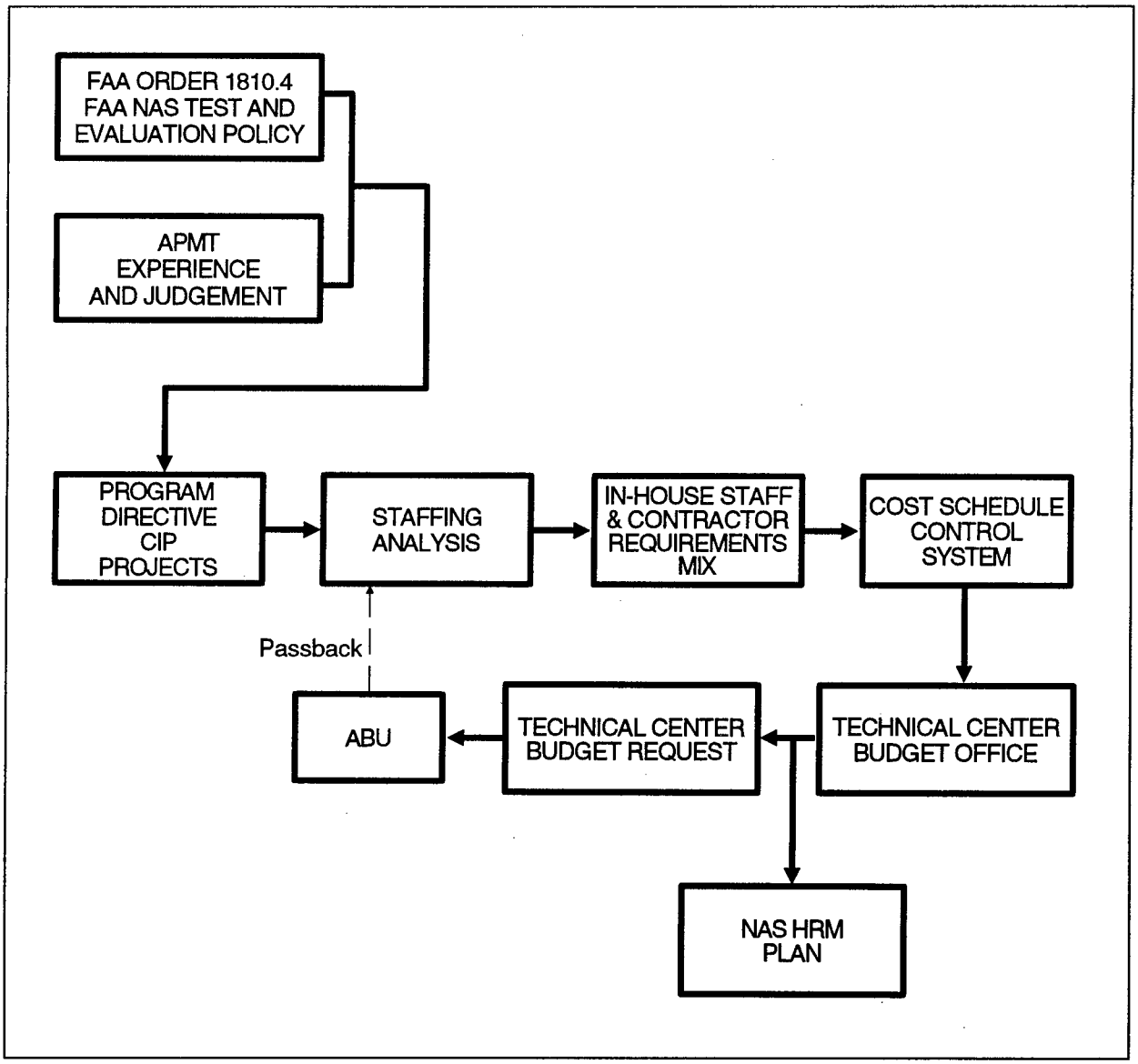


Figure 4-1. Technical Center HRM Planning Process

FAA Technical Center Human Resource Requirements

Introduction and Assumptions

In the 1990 NAS HRM Plan, the methodologies used to generate requirements for the *Engineering, Test, and Evaluation Service* (ACN) Divisions differed significantly. For this version of the NAS HRM Plan, the Technical Center utilized a single, comprehensive, mainframe system, the CSCS, for estimating requirements for all organizations and all systems. The CSCS is currently being converted to a PC-based system. The CSCS employs ARTEMIS 2000 software to monitor and report system performance data, schedules, and human resource requirements. Delivery dates used in CSCS are obtained from APMTs who receive delivery date projections from FAA Headquarters program managers. These delivery dates are those used in the PDs fixed on or about October 1, 1991.

The CSCS currently projects resource requirements through FY98. These requirements are estimated by the individual APMTs at the Technical Center, using their judgment and guidance provided by the most recent version of FAA Order 1810.4. It is the responsibility of the APMT to include all relevant requirements including: direct hands-on testing and evaluation; certain training (on-the-job training, contractor-provided training, review of contractor-provided documentation); and support and overhead requirements, if any.

The CSCS also tracks and reports F&E human resource requirements in terms of FTEs, where one FTE is equivalent to 1,872 person-hours. The difference between 1,872 hours and 2,080 hours (40 hours per week times 52 weeks per year) is 208 hours, and this represents allowances for annual leave, sick leave, and holidays.

Overview and Results

Table 4-1 summarizes the total F&E human resource requirements for all CIP systems across resource categories during FY94-98 which impact the Technical Center. These requirements vary from year to year due to equipment deliveries, peaking in FY94 and gradually decreasing to FY98. The decrease in projected requirements reflects the anticipated progress in implementing AAS and VSCS, as well as other projects.

Table 4-1. FAA Technical Center Total F&E Requirements

	FY94	FY95	FY96	FY97	FY98
Advanced Automation	330	326	303	288	288
Automation	119	88	86	77	74
Surveillance	34	34	23	21	22
Comm. & A/C Acq.	69	66	61	57	56
Navigation Landing	68	69	69	69	68
Weather/Flight Serv.	39	27	28	26	26
Maintenance & OPS	196	218	218	219	219
NAS Mgmt. Auto. Supp.	25	26	26	26	26
Totals	880	854	814	783	779

Notes: Requirements in FTEs (1,872 productive labor hours per year).

FAA Technical Center Human Resource Availability

Introduction and Assumptions

The Service Level Database, a part of CSCS, maintains a detailed inventory of in-house Technical Center staff by series, specialty, and grade for the current FY. The current inventory serves as a baseline to assess future availability of personnel.

Over the FY94-98 time frame, the Technical Center's objective is to increase the portion of total F&E human resource requirements accomplished by FAA in-house staff to approximately 65 percent (including overtime), and decrease contractor support to approximately 35 percent. This will require additional position allocations, which the Technical Center can fill since it does not currently face, or foresee in the future, a problem selecting and retaining qualified staff to fulfill in-house requirements. The Technical Center currently has a backlog of applicants, many of whom have recently left *Department of Defense* (DOD) agencies or private contractors, and others available due to the downturn in the economy in the Northeast.

Overview and Results

During the period FY94-98, the Technical Center is targeting FAA in-house availability (including overtime) sufficient to accomplish approximately 65 percent of total F&E requirements. The remainder will be accomplished with contractor support. In-house availability over the period FY94-98 is projected in Table 4-2 below.

Table 4-2. FAA Technical Center In-House Availability

	FY94	FY95	FY96	FY97	FY98
FAA	441	453	469	466	466
FAA Overtime	44	43	41	39	39
Total FAA Availability	485	496	510	505	505
Total Requirements	880	854	814	783	779
Percent of Requirements	55%	58%	63%	65%	65%

Notes: Availability in FTEs (1,872 productive labor hours per year).

FAA Technical Center Human Resource Plan

In the 1990 NAS HRM Plan, the Technical Center planned to accomplish F&E human resource requirements for the three CIP systems examined (ISSS, PAMRI, VSCS) with a mix of FAA staff (a combination of new hires and existing FAA staff), overtime, and contractor support. This mix was projected to be 57 percent, 5 percent, and 38 percent, respectively. For FY94-98, the Technical Center will use the mix of FAA staff, overtime, and contractor support shown in Table 4-3. This mix reflects

the Technical Center's objective of increasing the proportion of total F&E requirements accomplished by in-house staff.

Table 4-3. FAA Technical Center Mix of FAA, Overtime, Contractor Support

	FY94	FY95	FY96	FY97	FY98
FAA	50%	53%	58%	60%	60%
Overtime	5%	5%	5%	5%	5%
Contractor	45%	42%	37%	35%	35%
	100%	100%	100%	100%	100%

Figure 4-2 illustrates the total human resource requirements met through FAA staff, overtime, and contractor support for each year in the FY94-98 time frame. As Figure 4-2 shows, the majority of human resource requirements in FY94-98 are to be accomplished by FAA in-house staff and overtime.

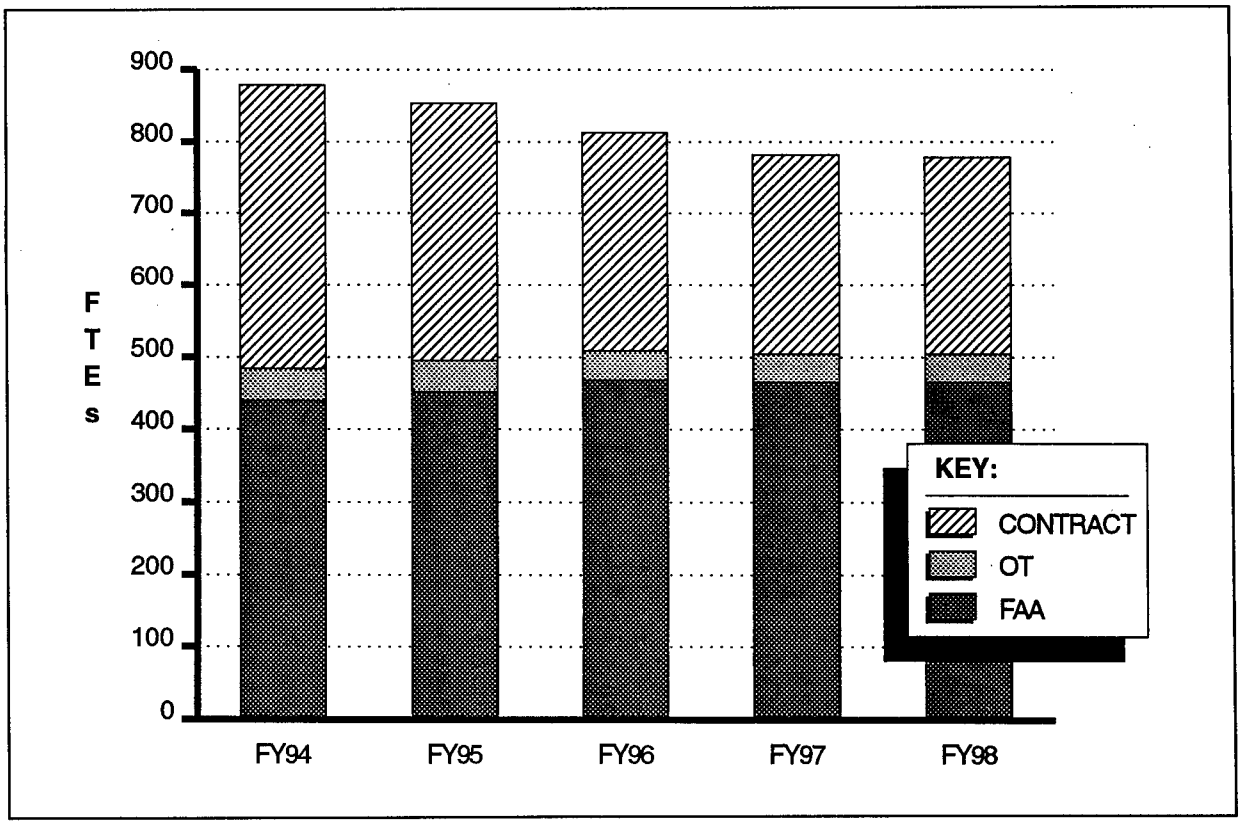


Figure 4-2. Total Human Resource Requirements

FAA Technical Center Management Actions

Successful implementation of the Technical Center's NAS HRM Plan requires that the Technical Center increase its size of in-house staff and decrease its contractor support relative to current levels. The Technical Center believes this objective is attainable if additional staffing allocations are appropriated in the budget process. As mentioned, the Technical Center does not currently face a shortage of qualified applicants to fill vacancies and new positions. Position requests are incorporated into budget requests through standard budget procedures.

CHAPTER 5: FAA AERONAUTICAL CENTER

INTRODUCTION AND SCOPE

The Mike Monroney Aeronautical Center is a major organizational complex which provides vital service and support functions for the FAA and the *Department of Transportation* (DOT). The Aeronautical Center's primary activities are in the areas of supply, service, and training. The supply function at the Aeronautical Center, organizationally located in the FAA Logistics Center, involves planning and executing the agency's logistics functions and performing the most sophisticated level of maintenance at the FAA and/or repair of equipment and systems in support of the NAS. The FAA Academy, which is a principal organizational component of the Aeronautical Center, is the agency's main source of technical training. Each year thousands of FAA personnel receive training needed to operate and maintain the NAS.

Other service and support functions at the Aeronautical Center range from providing information management for the FAA and DOT, to developing and implementing occupational assessment systems for the FAA.

The 1991/92 NAS HRM Plan for the Aeronautical Center primarily consists of the transition requirements for the Logistics Center and the Academy, the two organizations most affected by the NAS modernization. To date, progress in HRM planning at the Aeronautical Center has been centered around these two organizations because of the impact of the NAS modernization on their activities and their direct involvement in providing support to the NAS.

There are two organizational units at the Aeronautical Center who provide direct support to the Academy in their mission of providing agency-wide technical training. The Academy Maintenance Support Branch of the Facility Support Division provides periodic and on-call service, calibration, and modification of the various AF and AT systems used for training at the Academy. The Training Systems Section of the Data Services Division provides systems analysis and design, operations, software development and maintenance, and project management for AT simulation systems used for ATCS training.

Neither the Maintenance Support Branch nor the Training Systems Section have been involved, to date, in the AHD-300 process of institutionalizing an ongoing integrated human resource planning process for NAS modernization efforts. However, both organizations do have procedures established for projecting human resource needs and determining how these needs will be met in order to accomplish the mission of the organization.

The resources available to the Academy Maintenance Support Branch and the Training Systems Section directly impact the level of support provided to the Academy in their mission of agency technical training. Therefore, in order to provide a complete picture of total human resource needs required to accomplish the technical training of AF and AT personnel, the Academy Maintenance Support Branch and the Training Systems Section are included in the 1991/92 Aeronautical Center HRM Plan.

Future HRM planning at the Aeronautical Center will be directed toward a continued emphasis on the Logistics Center and the Academy as these organizations define their HRM planning needs and work toward developing and refining models to support their HRM planning process. In addition, efforts will begin to develop an integrated human resource planning process for all organizations at the Aeronautical

Center. The support mission of the Aeronautical Center to the entire agency dictates that every organization will, to some extent, be impacted by the NAS modernization. Therefore, human resource planning efforts will include all Aeronautical Center organizations in order to develop a process that will ensure that the Aeronautical Center can adequately anticipate, plan for, and respond to the many changes which the agency will face in the future.

LOGISTICS CENTER

Introduction and Scope

The functions performed by the Logistics Center range from the cataloging, warehousing, and shipping of spare parts, to the diagnostics and repair of highly sophisticated equipment. The Logistics Center provides supply support for NAS subsystems and equipment through inventory of supplies, spare parts, etc., and depot level repair of equipment/components through either the Logistics Center repair shops or commercial sources. The NAS HRM Plan examines the impact of various systems on each of the operational areas of the Logistics Center.

Planning Process

The Logistics Center is currently using the locally developed Supportability Database for projecting HRM requirements. This database integrates several automated processes to provide information and projections. The Supportability Database uses provisioning data, contract data, and, when available, *Logistics Support Analysis* (LSA) data to support the analysis process. Information contained in the databases on systems to be developed is based upon official agency documents such as the CIP. The LSA data are manipulated using a software program called SLIC. Methods of providing an automated interface between the Supportability Database and SLIC are being explored. Supportability Database time frame and support options can be varied to meet analysis requirements. The Supportability Database will also interface with the HRM modeling effort to enhance capabilities. The Supportability Database is currently used as a management tool to develop HRM projections for use with budget submissions. *Consolidated Personnel Management Information System* (CPMIS) data and information are used for analysis of availability. The Logistics Center is working in support of the human resource planning effort by continuing to refine the automated processes currently in place, and to develop and integrate with the HRM modeling effort, including the pipeline analysis developed by AHD-300. When completed, the pipeline model will provide HRM availability data, including retirements, training time, and other data for availability considerations. Figure 5-1 traces the Logistics Center's human resource planning process.

Modernization Requirements

The Logistics Center is affected by numerous possible system maintenance scenarios. These scenarios range from complete supply and repair support, to no involvement, depending upon the support and maintenance policy adopted for each individual NAS system. Therefore, Logistics Center HRM requirements must be analyzed and continually adjusted as NAS system requirements are defined. Large NAS system requirements, including the AAS, are being analyzed and will continue to be analyzed as system acquisition information is updated. All transition requirements identified assume that both supply support and repair will be provided by the Logistics Center.

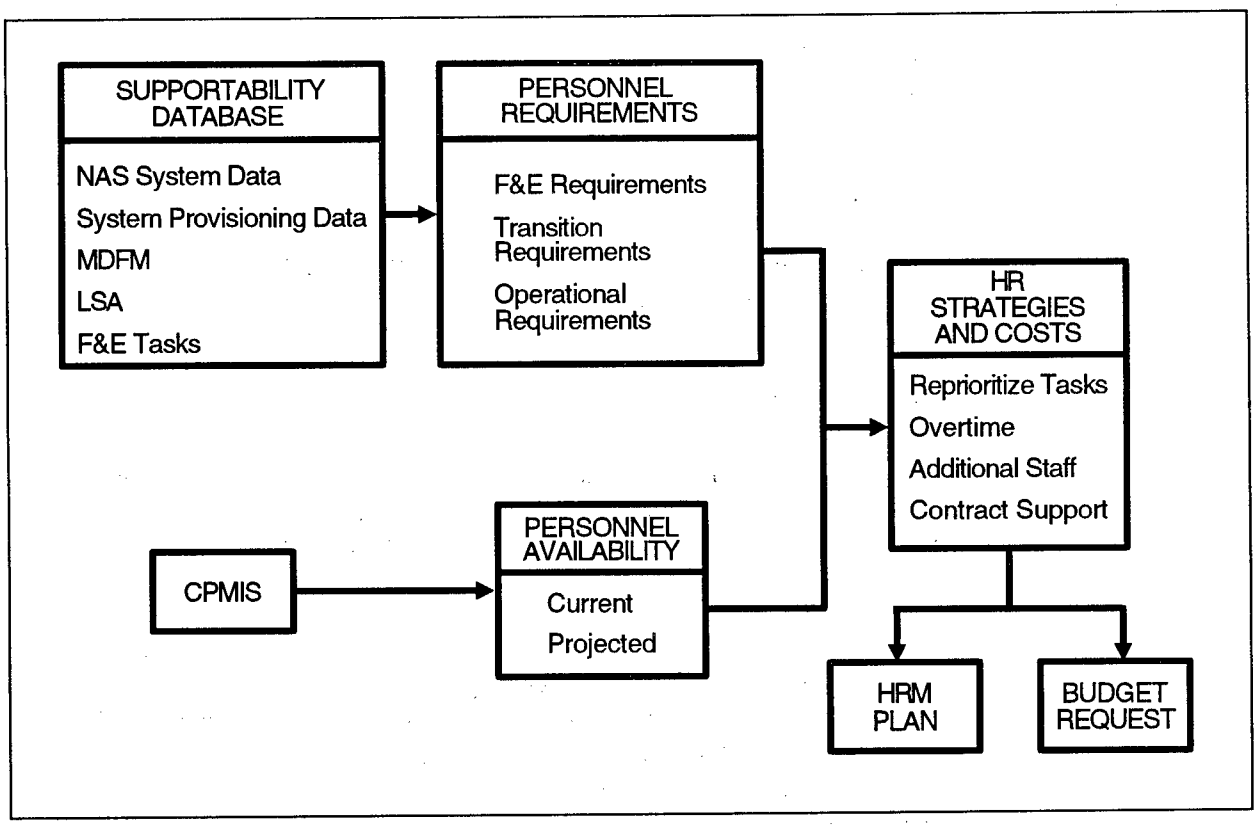


Figure 5-1. Logistics Center HRM Planning Process

System support dates were formulated by using the last *Operational Readiness Date* (ORD) (MDFM, where available for a system). This schedule is updated as the MDFM is updated. The number of interim contractor support years are added to the last system ORD resulting in a Depot support date. These new systems usually provide for interim contractor support rather than initial Logistics Center support. Therefore, in order for Logistics Center HRM planning to be more realistic and pertinent for planning purposes, the Logistics Center system support date is used for HRM calculation purposes.

Following is a list of equipment/systems which will impact the Logistics Center during the FY95-98 time frame. Project/system definitions can be found in the glossary.

Air to Ground Linear Power Amplifier (A/G LPA)
Environmental Remote Monitoring System (ERMS)
Instrument Landing System (ILS) Wilcox 2
Low Level Wind Shear Alert System (LLWAS) Mod 22
Mode Select (Mode S); Discrete Addressable Secondary Radar System with Data Link
National Airspace Data Interchange Network (NADIN) 2
Interim Support Plan (ISP) SST *Air Route Surveillance Radar* (ARSR)
Terminal Doppler Weather Radar (TDWR)
ISSS
Airport Movement Area Safety System (AMASS)
Integrated Communications Switching Systems (ICSS) PH1B ST1
Microwave Landing System (MLS)

RVR
Real-Time Weather Processor (RWP)
Small Tower Voice Switch (STVS)
VSCS
Area Control Computer Complex (ACCC)
Terminal Advanced Automation System (TAAS)
Long Range Radar (LRR)
Terminal Radar Digitizing, Replacement, & Establishment (TERM RAD DIG)
Air Traffic Control Beacon Interrogator (ATCBI) Replacement
Data Link Processor Enhancements (DLP ENH)
ICSS BU ISP
Tower Communications System (TCS)

The Logistics Center human resource requirements are dependent upon the supply support and maintenance policy for each individual NAS system. Information concerning supply support and maintenance policy is required early in the acquisition process to ensure the Logistics Center has time to identify, budget, and train employees.

The following systems have been analyzed and are listed by year of initial impact to the Logistics Center. Workload data were collected in terms of direct work hour requirements for item management and Logistics Center shops repair. The hours required for the *Engineering and Production Branch* (AAC-440) were computed using the number of projected annual *Exchange and Repair* (E&R) transactions for each system. Once data were collected for requirements in terms of hours, this was converted to employees, or FTEs, required. The number of hours used for calculation of OPS and F&E is 1,744 based upon the A-76 standard.

For AAC-440 the following algorithms were used:

E&R projections = number of E&R transactions * standard repair hours /1744

For AAC-480 the following algorithms were used:

E&R projections = (2.95 * number of E&R *National Stock Numbers* [NSNs]) /1744
Expendable projections = (.5 * number of E&R NSNs * 7) /1744
F&E projections = (3.7 * [no. of E&R * .2]) /1744

The FY94 base equals 860. The FY94 base represents the total employee requirement as identified in the Logistics Center's FY94 budget submissions. The FY94 level is a composite of the FY92 existing staffing level of 600 plus staffing identified for FY93-94 of 260.

Tables 5-1 through 5-4 present the Logistics Center's transition requirements for FY95-98.

Table 5-1. FY95 Logistics Center Transition Requirements		
CIP No.	**System**	**Positions Required**
21-11	VSCS	17.8
21-12B	AAS ISSS	2.4
22-12	STVS	.3
23-02	RWP	.2
23-13	ICSS PH1B ST1	.4
24-07	MLS	4.2
44-29	RVR-RE	1.4
62-23	AMASS	.3
	Total FY95	27.0
Notes: Requirements in FTEs (1,744 productive labor hours per year).		

Table 5-2. FY96 Logistics Center Transition Requirements		
CIP No.	**System**	**Positions Required**
21-11	VSCS	17.8
21-12B	AAS ACCC	6.1
21-12B	AAS ISSS	2.4
21-12B	AAS TAAS	6.1
22-12	STVS	.3
23-02	RWP	.2
23-13	ICSS PH1B ST1	.4
24-07	MLS	4.2
24-15	LRR	4.2
34-13	DIG TERM	11.8
44-29	RVR-RE	1.4
62-23	AMASS	.3
	Total FY96	55.2
Notes: Requirements in FTEs (1,744 productive labor hours per year).		

Table 5-3. FY97 Logistics Center Transition Requirements		
CIP No.	**System**	**Positions Required**
21-11	VSCS	17.8
21-12B	AAS ACCC	6.1
21-12B	AAS ISSS	2.4
21-12B	AAS TAAS	6.1
22-12	STVS	.3
23-02	RWP	.2
23-13	ICSS PH1B ST1	.4
24-07	MLS	4.2
24-15	LRR	4.2
34-13	DIG TERM	11.8
44-29	RVR-RE	1.4
44-46	ATCBIRE (MD-S)	2.9
62-23	AMASS	.3
	Total FY97	58.1
Notes: Requirements in FTEs (1,744 productive labor hours per year).		

Table 5-4. FY98 Logistics Center Transition Requirements		
CIP No.	**System**	**Positions Required**
21-11	VSCS	17.8
21-12B	AAS ACCC	6.1
21-12B	AAS ISSS	2.4
21-12B	AAS TAAS	6.1
22-12	STVS	.3
22-12	TCS SWITCH	3.1
23-02	RWP	.2
23-13	ICSS PH1B ST1	.4
24-07	MLS	4.2

Table 5-4. FY98 Logistics Center Transition Requirements		
CIP No.	**System**	**Positions Required**
24-15	LRR	4.2
34-13	DIG TERM	11.8
44-29	RVR-RE	1.4
44-46	ATCBIRE (MD-S)	2.9
46-30	ICSS BU ISP	.6
62-23	AMASS	.3
63-05	DLP ENH	.2
	Total FY98	62.0
Notes: Requirements in FTEs (1,744 productive labor hours per year).		

Approach for Providing Resources

The Logistics Center human resource requirements are dependent upon the supply support and maintenance policy for each individual NAS. Information concerning supply support and maintenance policy is required early in the acquisition process to ensure that the Logistics Center has time to identify, budget, and train employees. Because of the Logistics Center's role, it is believed that there will be no negative resource impact (displaced employees) from decommissioned systems.

Current and future employees will require training to meet the technological advances of the new systems. Where technical skills are needed, a human resource pipeline is vital. The Logistics Center is working with AHD-300 for the development of a pipeline model specific to Logistics Center needs. Training must be accomplished to ensure technical capabilities are in place prior to assuming repair responsibilities. Depot level training for new technical personnel is, at a minimum, a 2-year process.

During FY95-98, additional technical resources will be required to meet the rise in demand for repaired equipment. These resources are not available within the Logistics Center and outside hiring will be required. Candidates are usually selected from area technical schools and meet requirements for an associate degree in electronics. The Logistics Center is continuing to identify and request human resources to meet its technical responsibilities.

Additional item managers will be required to support additional inventory. These positions are normally filled from within the Logistics Center. Therefore, outside hiring at lower levels must be accomplished to compensate for promotions and movement into the item manager positions.

Currently, the Logistics Center warehousing operation is under A-76 and is transitioning to its most efficient personnel organization. Human resource requirements for the warehousing functions *Storage and Transportation Branch* (AAC-430) were developed by the *Management Services Division* (AAC-60) through a management efficiency study for the most efficient personnel organization. Through A-76 competition, the Raytheon Company is now responsible for cataloging functions. Raytheon will also

provide test equipment repair and calibration, engineering services, and non-metallic services. Appendix B provides a functional breakout of Logistics Center services which are performed in-house or by contractor.

The Logistics Center continues to support the NAILS process. When available, the LSA information, provided under the NAILS process, will interface with the Supportability Database and the Logistics Center/AHD-300 modeling effort to assist in the projection making process.

ACADEMY

Introduction and Scope

The purpose of the 1991/92 NAS HRM Plan is to provide data necessary to develop a long-range, integrated strategy necessary to manage the human resources required to support the NAS modernization initiatives and projects. Requirements specified in this NAS HRM plan are based upon projections which take into account pipeline and full life cycle (initial and recurrent) training for maintenance and operation of the modernized system. This edition of the NAS HRM Plan includes non-student requirements by major system impact for the AT Branch and a summary of non-student requirements which will impact the Logistics and Aviation Standards Branches. The AF Branch is faced with the unique problem of planning for continued training on existing systems as well as planning for a multitude of new systems training. This dual training approach in AF has caused the branch to reexamine its planning process and explore the development of processes to adequately capture both existing and new system training requirements. Because of this transition period in the AF Branch, detailed system requirements are not included in the 1991/92 NAS HRM Plan, but will be included in future NAS HRM Plans.

FAA Headquarters establishes all agency technical training requirements. These requirements are validated and programmed for development by the *Office of Training and Higher Education* (AHT-1) and conveyed to the Academy "to develop and conduct resident courses of training, both at the Academy and elsewhere within the agency, in several program areas assigned..." (FAA Order 1100.5, p. 1685). The Academy, in accordance with Aeronautical Order 1100.21, is responsible for developing training plans and materials, and conducting resident, non-resident, and directed study courses to meet system wide training requirements. In addition, the Academy will continue to ensure the existence of an integrated quality control program and to guarantee the availability of a training system which is separate from the operational system. The deployment of CIP projects will generate training requirements for initial, transition, and recurrent training necessary to prepare agency operational human resources and ensure the integrity of the NAS.

The scope of the 1990 NAS HRM Plan was limited to transition training for the ISSS, PAMRI, and the VSCS. Agency requirements for initial and recurrent training development and courseware maintenance must also be addressed to ensure pipeline and life-cycle training support. The scope of this human resource plan includes requirements related to all CIP projects to be deployed in the FY94-98 time frame for the Academy organizations mentioned above. It provides the numbers of human resources necessary to support transition, pipeline, and life-cycle training requirements of AAS components: ISSS, TAAS, *Tower Control Computer Complex* (TCCC), and ACCC, as well as other CIP projects (e.g., VSCS, *Flight Service Automation System* [FSAS], TCS, etc.) requiring initial operations and maintenance training for developmental employees and recurrent field training support, courseware maintenance, and revision.

Background

The modernization projects of the NAS during the FY94-98 time frame are included in the CIP. The CIP describes the policies and strategies that the FAA will pursue in addressing key concerns of the NAS. In addition, it provides the foundation for the evolution of the existing NAS through the use of technologies and development of new products obtained through continuing research. Over 200 projects are contained in the CIP, many for systems and equipment in the design stage and yet to be built. However, many of CIP projects will be deployed in FY94-98.

Central to the deployment of these modernized systems is the AAS. The AAS represents a quantum step forward in the automation of ATC operations. Aviation activity is forecast to increase substantially by the year 2000. This continued growth in aircraft operations, numbers of aircraft, enplanements, diversity of operations, and advances in aircraft design will place unprecedented demands on the NAS. The recurring theme of the NAS Plan and agency initiatives is that the solutions for these and other future contingencies lie in the greater utilization of automation. The AAS will replace aging hardware systems with new technologies that will allow the expansion of current system capabilities and data sources. AAS will also replace existing NAS software to meet future ATC functional and capacity requirements. AAS will provide a new automation system that includes improved ATCS work stations (common consoles), computer software, and high speed processors. These enhancements to the NAS will allow improvements in airport and airspace utilization, as well as increase system reliability, maintainability, and availability.

The AAS in the FY94-98 time frame consists of four implementation phases: ISSS, TAAS, TCCC, and ACCC. Each of these program components will impact the agency's technical training programs, more specifically, Academy training programs, and the human resource and fiscal requirements necessary to support pipeline and life-cycle training. AAS deployment will require the development of initial and recurrent training for each phase to ensure both a smooth transition and supportability throughout the life-cycle of the systems. In addition, numerous CIP projects are interdependent with the AAS and will require pipeline and life-cycle training support.

The integration of these systems within the NAS will impact both the job and cognitive environment of ATCSs and the personnel required to maintain these diverse projects. Changes in both equipment operation skills, ATC procedures, and equipment maintenance concepts will generate initial and recurrent training requirements throughout the evolutionary modernization of the NAS.

Planning Processes

The Academy has detailed staffing standard models, which have been automated, for the identification of resource requirements for student workload. For the non-student workload, the organization has initiated long-range planning to identify curriculum development activities necessary to provide initial and recurrent training in support of CIP projects. Long-range planning provides informed estimates from which to develop human resource and fiscal requirements. The Academy participates in integrated logistics planning processes and supports activities designed to refine the human resource planning process. Currently, the branches within the Academy are identifying additional areas to be supported by the AHD-1.

The non-student workload planning process is supported by automated databases and incorporates information gathered through front-end analyses activities, review of contractual documents (e.g., design documentation, system level specifications and statements of work), support of the Deployment Readiness

Review process, and coordination with FAA Headquarters personnel. Figure 5-2 presents the Academy AT Branch's human resource planning process. This process has resulted in preliminary planning (e.g., ISSS/VSCS Curriculum Development Implementation Plan) to support instructional system development activities necessary to provide standardized and valid ISSS/VSCS training to ATCS developmentals who operate the system and to electronic technicians who maintain the NAS. Plans will be formulated for each major component of the AAS.

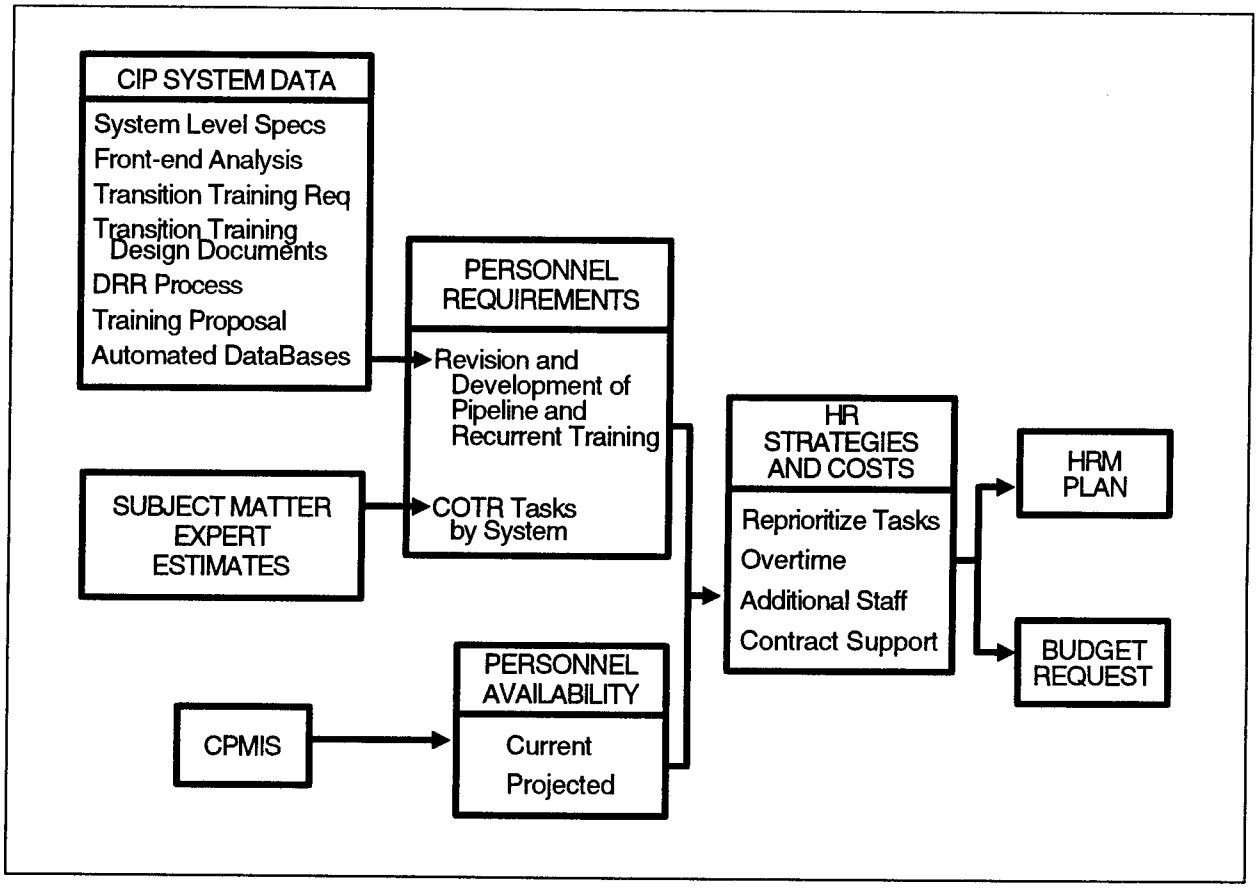


Figure 5-2. Academy AT Branch HRM Planning Process (CIP System Non-Student Workload)

Planning data include the identification of 54 systems to be delivered to the Academy for training through FY98, and the development of 179 new resident courses to support these systems. Additional training requirements have been identified for interim training to support non-CIP projects including Common Digitizer, ARTS-IIIA upgrade, and certain navigation systems. The requirements to support training for other agencies, such as the military services, the *National Weather Service* (NWS), and foreign governments have also been included for planning purposes.

Final human resource estimates may be impacted by actions performed and additional information received during the course of front-end analysis (e.g., identification of performance requirements, training requirements development process, etc.) and the curriculum design/development effort. The requirements specified in ***AT Project Requirements*** represent human resources necessary to support transition as well

as pipeline and life-cycle training (initial and recurrent) for CIP projects in the FY94-98 time frame. A progressive refinement of resource requirements will occur as projects near deployment.

Assumptions

The human resource estimates provided in ***AT Project Requirements*** are predicated on the following assumptions:

- Pipeline and life-cycle (initial and recurrent) training requirements for CIP projects will be specified by the FAA Headquarters Offices (e.g., *Office of Air Traffic Program Management* [ATZ], *Associate Administrator for Aviation Standards* [AVS], *Systems Maintenance Service* [ASM], and *Aircraft Certification Service* [AIR]) as systems near deployment. Specified requirements, for the most part, will be programmed by the AHT-1 for Academy initial training development/delivery and recurrent training development, revision, and maintenance.

- The introduction of CIP projects and the resultant pipeline and life-cycle training requirements will require additional in-house and contractor human resources.

- AT transition training is contractor developed; however, all initial and recurrent training requirements must be met by the Academy. The Academy must be positioned to assume course maintenance responsibility at the termination of existing contracts to ensure system supportability.

- Training design, development, revision, and maintenance activities incorporating state-of-the-art technologies and training strategies within the resident and field training curricula will require more human resources than current conventional development (i.e., a *Computer Based Training* [CBT]/*Interactive Video Instruction* [IVI] team consists of a designer, writer/developer, programmer, and graphics artist).

- CIP projects with identified training requirements will be supported by additional Academy personnel augmented by contractor support.

- Equipment maintenance concepts will require training at the system and service level. Training will continue to be required as part of the employee certification process. Personnel will receive training at the analysis level and will require a broader skills mix than at present due to the consolidation of functions and the complexity of individual systems. Recurrent training will be necessary to maintain personnel proficiency.

- Academy human resource requirements in support of the NAILS (FAA Order 1800.58) processes will increase as systems near field deployment and contractor transition training deliverables require review and evaluation to ensure compliance with policies and standards. The Academy will accomplish contract administration, quality assurance of contractor-developed materials, and contracting officer delegated authority in accordance with *Federal Acquisition Regulations* (FAR) (contracting officer technical representative) for newly-commissioned NAS training systems.

- Academy AT and AF personnel will be essential to transition training validation activities.

- Human resource requirements include both student and non-student workload.

- Human resource requirements related to transition training are based upon Academy responsibilities related to the NAILS process and FAA Order 1800.58. Human resource requirements for the development of initial and recurrent training are estimated for each project.

- Compensable personnel hours are estimated to be 2,080 per individual per year unless there are one or two extra days in a FY, with a productive year of 1,770 hours based upon approved staffing standards.

AT Project Requirements

Resource requirements specified are numbers above projected staffing levels for FY94-98.

Advanced Automation System: Initial Sector Suite System (CIP 21-12)

The deployment of ISSS will generate both initial and recurrent training requirements. Developmentals will need to attain automatic levels of performance on equipment input devices (i.e., keyboard, trackball, function keys) and master the use of a windowed operating environment, overhead auxiliary display, communication system, and *Flight Data Entry Notation* (FDEN).

Training for ATCS developmentals will be initiated at the Academy prior to operational deployment at Seattle ARTCC scheduled for August 1995. Specification of human resources necessary to effect this project within the AT training program are divided into two categories: resources necessary to support transition training (i.e., provide integrated logistics support services as specified in FAA Order 1800.58) and resource requirements necessary to develop initial and recurrent training in support of ISSS deployment. ISSS transition training requirements and requirements for initial and recurrent training development, revision, and maintenance are presented in Tables 5-5 and 5-6.

Table 5-5. ISSS Transition Training Requirements

FY94	FY95	FY96	FY97	FY98
2.5	5.0	7.0	7.0	7.0

Notes: Requirements in FTEs (1,770 productive labor hours per year). Requirements per FAA Order 1800.58.

Table 5-6. ISSS Requirements for Initial and Recurrent Training Development, Revision, and Maintenance

FY94	FY95	FY96	FY97	FY98
8.0	12.0	14.0	15.0	16.0

Notes: Requirements in FTEs (1,770 productive labor hours per year). Projected requirements are based upon an estimated 30,000 hours of non-student workload necessary for the development of initial and recurrent ISSS training.

Advanced Automation System: Terminal Advanced Automation System (CIP 21-12)

The introduction of TAAS will have significant impact on the job environment and performance requirements of the terminal ATCS. The introduction of the common console will impact the ATCS's computer-human interface skills, procedures for performing established tasks, and housekeeping operations. These changes will generate both initial and recurrent training requirements.

Training for ATCS developmentals will be initiated at the Academy prior to operational deployment at Seattle scheduled for January 1997. TAAS transition training requirements and requirements for initial and recurrent training development, revision, and maintenance are presented in Tables 5-7 and 5-8.

Table 5-7. TAAS Transition Training Requirements

FY94	FY95	FY96	FY97	FY98
1.5	3.0	5.5	8.0	8.0

Notes: Requirements in FTEs (1,770 productive labor hours per year). Requirements per FAA Order 1800.58.

Table 5-8. TAAS Requirements for Initial and Recurrent Training Development, Revision, and Maintenance

FY94	FY95	FY96	FY97	FY98
2.0	10.0	18.0	20.0	22.0

Notes: Requirements in FTEs (1,770 productive labor hours per year). Projected requirements are based upon an estimated 30,000 hours of non-student workload necessary for the development of initial and recurrent TAAS training.

Advanced Automation System: Tower Control Computer Complex (CIP 21-12)

Training to support this segment of the AAS deployment will be determined as a result of front-end analysis activities. The introduction of automation in the tower environment will generate both initial and recurrent training requirements. Training for ATCS developmentals will be initiated prior to operational deployment at Seattle in February 1997. TCCC transition training requirements and requirements for initial and recurrent training development, revision, and maintenance are presented in Tables 5-9 and 5-10.

Table 5-9. TCCC Transition Training Requirements

FY94	FY95	FY96	FY97	FY98
1.5	3.0	5.5	8.0	10.5

Notes: Requirements in FTEs (1,770 productive labor hours per year). Requirements per FAA Order 1800.58.

Table 5-10. TCCC Requirements for Initial and Recurrent Training Development, Revision, and Maintenance				
FY94	**FY95**	**FY96**	**FY97**	**FY98**
2.0	7.0	12.0	14.0	16.0
Notes: Requirements in FTEs (1,770 productive labor hours per year). Projected requirements are based upon an estimated 18,000 hours of non-student workload necessary for the development of initial and recurrent TCCC training.				

Advanced Automation System: Area Control Computer Complex (CIP 21-12)

Training to support this segment of the AAS deployment will be determined as a result of front-end analysis activities. The introduction of ACCC will generate both initial and recurrent training requirements. Initial training for ATCS developmentals will be initiated prior to operational deployment at Seattle in February 1998. ACCC transition training requirements and requirements for initial and recurrent training development, revision, and maintenance are presented in Tables 5-11 and 5-12.

Table 5-11. ACCC Transition Training Requirements				
FY94	**FY95**	**FY96**	**FY97**	**FY98**
1.5	3.0	4.5	6.0	8.5
Notes: Requirements in FTEs (1,770 productive labor hours per year). Requirements per FAA Order 1800.58.				

Table 5-12. ACCC Requirements for Initial and Recurrent Training Development, Revision, and Maintenance				
FY94	**FY95**	**FY96**	**FY97**	**FY98**
2.0	4.0	8.0	12.0	14.0
Notes: Requirements in FTEs (1,770 productive labor hours per year). Projected requirements are based upon an estimated 18,000 hours of non-student workload necessary for the development of initial and recurrent ACCC training.				

Voice Switching and Control System (CIP 21-11)

Training requirements for initial and recurrent training have not been finalized. As the FAA Headquarters offices identify training requirements, they will be incorporated into subsequent updates to this Plan. VSCS transition training requirements and requirements for initial and recurrent training development are presented in Table 5-13.

Table 5-13. VSCS Transition Training Requirements and Requirements for Initial and Recurrent Training Development				
FY94	**FY95**	**FY96**	**FY97**	**FY98**
3.0	4.0	4.0	4.0	4.0
Notes: Requirements in FTEs (1,770 productive labor hours per year). Requirements per FAA Order 1800.58.				

Flight Service Automation System (CIP 23-01)

The deployment of this project will generate both initial and recurrent training requirements.

FSAS transition training requirements and requirements for initial and recurrent training development, revision, and maintenance are presented in Tables 5-14 and 5-15.

Table 5-14. FSAS Transition Training Requirements				
FY94	**FY95**	**FY96**	**FY97**	**FY98**
1.0	2.0	3.0	3.0	3.0
Notes: Requirements in FTEs (1,770 productive labor hours per year). Requirements per FAA Order 1800.58.				

Table 5-15. FSAS Requirements for Initial and Recurrent Training Development, Revision, and Maintenance				
FY94	**FY95**	**FY96**	**FY97**	**FY98**
2.0	4.0	5.0	6.0	6.0
Notes: Requirements in FTEs (1,770 productive labor hours per year). Projected requirements are based upon an estimated 8,000 hours of non-student workload necessary for the development of initial and recurrent FSAS training.				

AF Project Requirements

As discussed above, the two services most affected by the deployment of CIP projects in FY94-98 are AT and AF. The strategies for transitioning their work force are different. As a result, the human resources required for FY94-98 to support CIP projects include both student and non-student workload. While the requirement for AT human resources is focused on the non-student workload necessary to develop initial and recurrent training, AF requirements include those necessary to support both student and non-student workload in life-cycle maintenance training for CIP projects and current systems.

In addition, the AF Service is currently facing a potential staffing shortage for several critical job series. This shortage is the result of a large number of potential retirees in the near future. Alleviating this shortage will require the hiring and training of a significant number of technical personnel. Therefore,

AF human resources projections must not only support the delivery of maintenance training for new projects to be deployed in the next 5 years, but must also ensure that adequate numbers of new personnel also receive training to support existing and new systems. These dual requirements should be considered in the development of human resource projections for FY94-98. At this time, estimates from the AF Service are not available for future planning. The Academy will work with the services to develop a process for sharing information and projecting requirements.

Central to the deployment of CIP projects is the AAP components: PAMRI, ISSS, TAAS, ACCC, and TCCC. Each of these systems will require training of AF personnel to maintain and ensure the integrity of the NAS. In addition, there are many interdependent and independent CIP projects that will require life-cycle maintenance training.

Additional Capital Investment Projects - FY94-98

Other CIP projects such as the *Direction Finder* (DF) (CIP 24-11), TCS (CIP 22-12), and others will generate initial and recurrent training requirements which will be integrated within Academy initial and recurrent training programs. Aircraft simulators and trainers will be used in general aviation and air carrier regulatory and certification training programs. This modern technology will support initial and recurrent training for aviation safety inspection, aircraft certification, airworthiness, and flight inspection personnel. As training requirements for these systems are identified by the FAA Headquarters offices, specification of human resource requirements will be updated in subsequent iterations of the NAS HRM Plan.

Preliminary estimates for human resource requirements to support integrated logistics processes specified in FAA Order 1800.58 and initial and recurrent development are presented in Table 5-16.

Table 5-16. Academy Human Resource Requirements for Additional CIP Projects

	FY94	FY95	FY96	FY97	FY98
AT	5.0	10.0	15.0	20.0	25.0
Logistics	2.0	4.0	7.0	9.0	10.0
Regulatory Standards and Compliance	2.0	5.0	6.0	7.0	8.0
Other	2.0	4.0	6.0	8.0	11.0

Notes: Requirements in FTEs (1,770 productive labor hours per year).

Summary of CIP Projects Human Resource Requirements

Table 5-17 summarizes Academy human resource requirements for CIP projects.

Table 5-17. Summary of CIP Project(s) Academy Human Resource Requirements					
	FY94	FY95	FY96	FY97	FY98
AT	32.0	67.0	101.5	123.0	140.0
Logistics	2.0	4.0	7.0	9.0	10.0
Regulatory Standards and Compliance	2.0	5.0	6.0	7.0	8.0
Other	2.0	4.0	6.0	8.0	11.0
Academy Totals	38.0	80.0	120.5	147.0	169.0
Notes: Requirements in FTEs (1,770 productive labor hours per year).					

Availability of Personnel with Requisite Training and Skills

The human resources necessary to support transition and full life-cycle operations and maintenance training fall in two distinct categories. These are human resources necessary to design and develop initial and recurrent training and those resources necessary to deliver this training to the operational human resources of the NAS.

The human resources necessary to support the delivery of the current and new initial training programs will be drawn from field personnel. These individuals must not only possess task relevant knowledge and skills on old and new systems, but must also demonstrate proficiency in the instructional process, methods, and strategies. As the Academy incorporates new state-of-the-art instructional technologies (e.g., *Computer Based Instruction* [CBI]/IVI, automated delivery systems, simulators, etc.), instructional personnel will have to be skilled in the utilization of these strategies in initial and recurrent training. AT will transition many of the existing instructors to new systems as they are deployed minimizing the need for additional instructional resources. However, AF will require many more instructional personnel to meet the requirements of training on new systems and providing initial training to new employees to meet attrition requirements.

Pipeline and life-cycle training to support CIP projects will also require a cadre of individuals (e.g., Instructional Systems Specialists, writer/developers, programmers, etc.) with skills and abilities in the development of complex technical training utilizing state-of-the-art technology (e.g., CBI/IVI, part-task trainers, simulators, etc.). These individuals must possess skills in the design and development of computer-based training, instructor-based training, and simulation training. Subject matter experts from each ATC option (en route, flight service, and terminal) are required to provide technical input into the design of the training courseware and devices as well as provide technical evaluation of the courseware to ensure content validity and currency. These subject matter experts must be drawn from current field personnel who, if possible, have been involved in AAS support teams (e.g., procedures, operational test and evaluation, requirements validation, etc.).

Existing courseware producers (e.g., systems specialists, writer/developers, programmers, etc.) are currently involved in curricula redesign efforts in each AT option. CBT/Simulation personnel are limited and are

expected to be unavailable due to current and projected tasking (i.e., *Interactive Instructional Delivery System* [IIDS] support, CBI conversion). Without this availability of requisite in-house resources, it is anticipated that personnel with requisite skills and training will be drawn from additional FAA and contractor personnel. A specification of the skills and abilities of personnel required to provide pipeline and life-cycle maintenance and operations training will be further defined in a subsequent update of the NAS HRM Plan.

Approach for Providing Resources

Several options have been examined to meet Academy human resource requirements in support of pipeline and life-cycle training for CIP projects in the FY94-98 time frame. The Academy human resource plan addresses transition and non-student workload requirements related to pipeline and life-cycle training for all components of the AAS (ISSS, TAAS, TCCC, and ACCC) to be deployed in FY94-98. In addition, interdependent AAS CIP projects and independent projects scheduled for deployment in FY94-98 were considered. The Academy plan for meeting these human resource requirements consists of four primary approaches:

- Resource management;
- Additional FAA employees;
- Contract support; and
- Utilization of overtime.

HRM is the effective and efficient utilization of our most important resources, people, to accomplish the mission and goals of the agency. The deployment of CIP projects will occur over the next decade and effective HRM will allow personnel to migrate from one development/delivery effort to another. This will provide an experienced cadre that can integrate and train new personnel as well as minimize the number of additional FAA employees necessary to fulfill student and non-student workload requirements.

Additional FAA employees will be required to support these CIP project development efforts. These individuals will be selected based upon their individual merit and task relevant skills and abilities. These resources will provide the cadre necessary to design, develop, and deliver initial and recurrent training that will ensure system supportability throughout the modernization of the NAS.

The contractor support included in the 1991/92 NAS HRM Plan is related to non-student workload in the design and development of initial and recurrent training in support of CIP projects. Extensive new development will be required to support these projects as they are deployed and continuous revision and maintenance will be required to support both Academy and field conducted portions of training. Much of this training will be presented utilizing state-of-the art technologies (i.e., CBT/IVI, part-task, and whole task high fidelity simulation) and strategies. The development of these training programs is labor-intensive and current FAA resources will be unable to meet ongoing curricula redesign initiatives and the design and development of CIP project training concurrently. As one moves to FY94, non-student workload in the design and development of initial and recurrent training increases substantially due to the requirement to continue existing programs as well as provide new equipment and procedures training in support of the AAS. This requirement does not diminish until complete deployment of the AAS, scheduled for 2000. In these years, the use of contractor support is anticipated to be 65 percent; FAA employees 30 percent; and 5 percent of the requirements met by overtime.

Other unique requirements that must be augmented by contractor support will be identified, and actions necessary to initiate the procurement of these services will be elevated to FAA management for review

and approval. Contractor support requirements will be evaluated on an activity-by-activity basis. Necessary contract support will be selected through various available options which include: Transportation Systems Center Omnibus contract; Office of Personnel and Management contract; sole source procurement; and competitive procurements and small purchase authority in accordance with appropriate regulations, policies, and procedures, etc.. Contracting Officers and Contracting Officer's Technical Representatives shall be appointed by the contracting authority.

Some overtime may be required to support the scheduled deployment of CIP projects.

Academy Management Actions

The approach of the Academy in addressing these requirements of CIP projects includes a number of actions. The human resource analysis conducted for ISSS, PAMRI, and VSCS was limited in scope and provided only a partial definition of the requirements necessary to support NAS modernization initiatives and CIP projects. It failed to address the requirement for life-cycle and pipeline training necessary to ensure the integrity of the NAS. The Academy has, in part, adopted the following actions to support and ensure adequate human resource planning for CIP projects which include pipeline and life-cycle training support in four categories: data, analyses/methodologies, tools/models, and process/organizational.

Data:

- Refine training requirements data.
- Develop improved workload and availability data.

Analyses/Methodologies:

- Develop improved workload estimation methodologies and databases.
- Develop methodology for mapping training curricula to job tasks.
- Conduct systematic analyses of training strategies/alternatives.

Tools/Models:

- Develop/refine human resource life-cycle costing tool.
- Develop analytic workload model.

Process/Organizational:

- Develop capability to rearrange organizational/position assignments.
- Develop better linkages between HRM Program and the budget process/cycle.
- Develop and implement an educational process to support human resource planning processes.

In addition, the Academy in FY91 consolidated NAS/CIP planning in the *Program and Project Management Branch* (AAC-920). This office is charged with coordinating all elements of training implementation to include fiscal planning for CIP projects. Each technical training branch, in accordance with the FAA Headquarters office, is involved in an ongoing analysis and determination of training requirements necessary to support the deployment of these systems and projects.

The continued involvement of Academy personnel in the integrated logistics support processes is a critical element in HRM planning. This involvement provides a vehicle for input into analysis, planning, design,

and transition activities central to these systems, and provides data necessary to project training requirements and plan for initial pipeline and recurrent life-cycle training.

Further, in an effort to attract the requisite personnel in the analysis, planning, development, and implementation of training to support these systems, the Academy has effected recruitment and selection of Instructional Systems Specialists, upgrades for instructor personnel, provisions for education and training, and professional advancement opportunities.

ACADEMY MAINTENANCE SUPPORT BRANCH

Introduction and Scope

The Academy Maintenance Support Branch performs periodic and on-call service, calibration, and modification of the various AF ground and installed electronic and electro-mechanical systems used for training in the Academy. System alignment, calibration, and malfunction analysis is also performed on AT training systems such as the *Radar Training Facility* (RTF) training system and the HOST system. Fifty-four percent of the Academy Maintenance Support Branch's resources are devoted to supporting the AF Branch of the Academy; 37 percent support the AT Branch; 8 percent are used to support the Logistics Center; and 1 percent supports ASM-600. The Academy Maintenance Support Branch is organizationally located within the Facility Support Division and is staffed with a highly trained work force of electronics technicians.

Planning Process

NAS oriented human resource planning efforts at the Aeronautical Center have not involved the Academy Maintenance Support Branch in the past because of the indirect impact of the NAS modernization on the organization. With this iteration of the NAS HRM Plan, emphasis is being placed on the Academy Maintenance Support Branch since the functions of the Academy are directly impacted by the maintenance support provided by this branch. Figure 5-3 represents the human resource planning process for the Academy Maintenance Support Branch.

Human Resource Requirements

The Academy Maintenance Support Branch currently determines human resource requirements by three separate methods. All three methods are driven by base system support requirements provided (primarily) by the Academy. The systems which will require Academy Maintenance Support Branch resources during a given year are those that will be: 1) used by the Academy to provide training; 2) newly installed or modified, requiring acceptance, inspection, training, preventative or corrective maintenance; and 3) kept in the inventory for training in future years, thus requiring preventative maintenance.

The first method of calculating human resource requirements is based upon established maintenance schedules and data that were gathered and provided to the Logistics Service *Resource Allocation Management Board* (RAMBO) Study. This study provided the organization with an established task list of activities required for all positions in the Academy Maintenance Support Branch with a calculated allowance for each activity. For electronics technicians in the Academy Maintenance Support Branch, the task list was comprised of *Preventative Maintenance* (PM), corrective maintenance, new system acceptance and inspection, standby laboratory assistance, system modification, training, and logistics support.

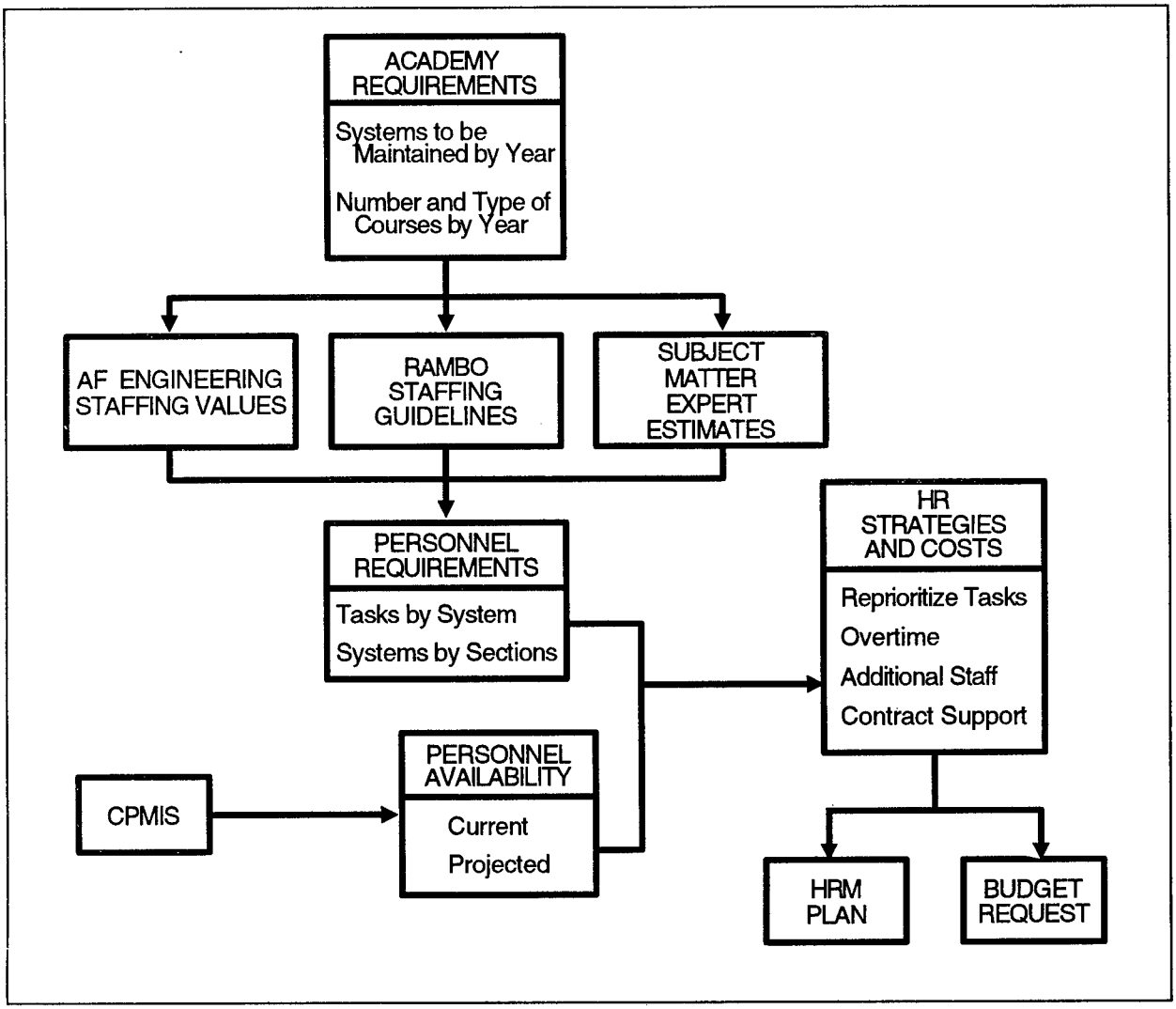


Figure 5-3. Academy Maintenance Support Branch HRM Planning Process

The second method for calculating human resource requirements relies on the data from the AF engineering workload values determined in work measurement studies carried out in the field. These values exist for current, future, and decommissioned systems. None of the allowances for travel time or unit staffing levels, which are used in calculating AF workload, are considered in the Academy Maintenance Support Branch calculations.

The third method is primarily subject matter expert estimates based upon experience and historical maintenance workload records. The branch has extensive baseline information regarding the requirements to maintain the Academy test beds and required PM schedules. Although the above sources of information used to determine human resource requirements have not been engineered and validated, they provide a sound starting point for projecting requirements due to NAS modernization.

It is worth noting that these three methods are performed independently and the results are then compared. The difference in the number of FTEs required using the three methods varies by only two or three positions (4 to 6 percent) out of more than 50 employees.

Personnel Availability

The availability of Academy Maintenance Support Branch personnel is projected from CPMIS data. Current staffing and authorizations provide the baseline. Retirement eligibility by section is then considered in making projections of the developmental and journey-level profile in future years. Other than retirements, attrition is not considered in this projection. The Academy Maintenance Support Branch has no additional authorization for a developmental pipeline, therefore, all hiring is done to fill vacancies of employees who have left the branch. With no increase in authorizations or hiring ceilings, it is projected that the branch will have roughly the same staffing each year that it has today. In some sections, more than half the employees are retirement eligible now. The developmental period for a non-experienced new hire is 2-1/2 to 3 years to reach journey-level. These facts indicate that there will be a shift in the developmental to journey ratio over the next 3 to 5 years, the profile during this period will be heavily weighted toward developmentals. This has major implications for meeting workload requirements because developmentals are much less productive than journey-level staff due to limited KSAs, and the fact that they are in training a large part of their time. While this profile is examined in the availability analysis, only the total number of personnel required are requested. Therefore, the difference between the number of personnel required and those available is based upon the current staffing level of 53 employees.

Human Resource Strategies

The planning process for delineating human resource strategies currently focused more on how the requirements can be met rather than on the relative costs of the alternative strategies. The four primary alternatives are overtime, deferring requirements, additional personnel, and contract support. Because the Academy Maintenance Support Branch already uses a great deal of overtime and is already deferring many requirements, acquiring additional personnel and getting funding for contract support are the two alternatives that appear most viable.

Budget Requests and the NAS HRM Plan

The results of the human resource planning process are incorporated into the budget submission for the Aeronautical Center. This year, for the first time, these results are also supporting this chapter in the NAS HRM Plan.

Modernization Requirements

The modernization requirements of the Academy Maintenance Support Branch are directly driven by the systems which will be delivered and used for training in the Academy. The following new systems have been identified as impacting the Academy Maintenance Support Branch's human resource requirements in the years indicated. The Academy has not provided the Academy Maintenance Support Branch with any information about the new systems that will need maintenance support in FY97 and FY98. Similarly, the Academy has provided no information on decommissioning of Academy systems for these years. Therefore, only Academy Maintenance Support Branch requirements for FY94-96 can be included in the 1991/92 NAS HRM Plan.

The requirements are presented in FTEs which can be equated to positions. The Academy Maintenance Support Branch uses 218 productive days as the amount of work that can be accomplished by an FTE in one year. The requirements for each year represent the increment or additional requirements in addition to those of all previous years. Thus, the FY94 requirement of 16.6 indicates that 17 more FTEs will be needed in addition to the 53 FTEs in the branch in FY91 and those additional staff requested to meet FY92 and FY93 requirements. The requirements for FY95 represent an increase of about three FTEs over the FY94 level. No system decommissioning is anticipated during the FY94-96 period. Requirements for the Academy Maintenance Support Branch for FY94-96 are presented in Tables 5-18 through 5-20.

Table 5-18. FY94 Academy Maintenance Support Branch Requirements

System	Positions
Air Route Surveillance Radar SST	.7
Area Control Computer Complex	.8
Flight Service Automation System Power Conditioning System	.5
Low Level Wind Shear Alert System	.3
Microwave Landing System	.4
Nondirectional Beacon	.5
Propane & Natural Gas Engines	.3
Radar Training Facility Expansion	6.8
Real-time Weather Processor	.6
Secondary Surveillance Radar	.7
Tower Simulator	5.0
Total FY94 Requirements	16.6

Notes: Requirements in FTEs (1,744 productive labor hours per year).

Table 5-19. FY95 Academy Maintenance Support Branch Requirements

System	Positions
Air Route Surveillance Radar SST	.7
Area Control Computer Complex	.8
Flight Service Automation System Power Conditioning System	.5
Global Positioning System Monitors	.5

Table 5-19. FY95 Academy Maintenance Support Branch Requirements	
System	**Positions**
Instrument Landing System/Microwave Landing System	.5
Low Level Wind Shear Alert System	.3
Microwave Landing System Phase II	.9
Microwave Landing System	.4
Nondirectional Beacon	.5
Propane & Natural Gas Engines	.3
Radar Training Facility Expansion	6.8
Real-time Weather Processor	1.1
Secondary Surveillance Radar	.7
Terminal Advanced Automation System	.3
Tower Simulator	5.0
Total FY95 Requirements	19.3
Notes: Requirements in FTEs (1,744 productive labor hours per year).	

Table 5-20. FY96 Academy Maintenance Support Branch Requirements	
System	**Positions**
Air Route Surveillance Radar SST	.7
Area Control Computer Complex	.8
Flight Service Automation System Power Conditioning System	.5
Global Positioning System Monitors	.5
Instrument Landing System/Microwave Landing System	.5
Low Level Wind Shear Alert System	.3
Maintenance Processor Subsystem	1.0
Microwave Landing System	.4
Microwave Landing System Phase II	.9
Nondirectional Beacon Replacement	.3

Table 5-20. FY96 Academy Maintenance Support Branch Requirements	
System	**Positions**
Nondirectional Beacon	.5
Propane & Natural Gas Engines	.3
Radar Training Facility Expansion	6.8
Real-Time Weather Processor	1.1
Remote Control Interface Unit	.5
Secondary Surveillance Radar	.7
Terminal Advanced Automation System	.3
Tower Simulator	5.0
Total FY96 Requirements	21.1
Notes: Requirements in FTEs (1,744 productive labor hours per year).	

Projected Availability

As described in the planning process, availability projections are based solely on one-for-one replacement of employees leaving the Academy Maintenance Support Branch, plus any additional staff that are provided to meet increased requirements. The Academy Maintenance Support Branch is currently authorized 55 employees and has a ceiling (based upon funding) of 53. An additional 16 FTEs were requested based upon FY92 requirements but none were provided. The FY93 request is 39, which includes the 16 requested in FY92. If the FY93 request is granted, the Academy Maintenance Support Branch will have 92 employees (about half of which will be developmentals). The availability to meet FY94 requirements would therefore be short at least 16.6 FTEs identified as additional FY94 requirements (ignoring FY94 losses, retirements and other attrition, from the Academy Maintenance Support Branch). Similarly, the availability of personnel for FY95 and FY96 are short only 2.7 and 1.8 FTEs respectively, if the personnel requests for previous years are met. If none of the requests for additional personnel (or contract funds) are granted between now and FY96, the availability shortfall will be approximately 60 FTEs.

Approach for Providing Resources

Traditionally, the maintenance of Academy training systems has been performed by employees of the Academy Maintenance Support Branch. Overtime has been used extensively (1,354 hours in FY91) to meet the requirements of the Academy when additional human resources were not available. Because of this high level, the use of additional overtime to meet these new requirements is not possible.

Another strategy already in use is re-prioritizing or deferring requirements. The requirements deferred are generally PM and training. While deferring PM requirements reduces the short-term staffing problems, it increases emergency and corrective maintenance requirements in the long-term. Deferring training requirements also allows more work to occur in the present, but reduces the capability of the branch to

meet future workload. The Academy Maintenance Support Branch is currently performing approximately 40 percent of the scheduled PM procedures and most of the training requirements. However, individuals are called out of training for emergency maintenance calls, if necessary, to provide the Academy the requisite level of service.

Contract dollars have been requested in previous budget submissions to perform PM functions on Academy systems. Although these requests have not yet been granted, contract support remains a viable option for meeting some of the requirements.

Additional FAA employees represent the most likely strategy for meeting the bulk of the requirements. Because of the uniqueness of the FAA and Academy's NAS equipment, it is difficult to find contract support who have the expertise to maintain the systems at the level required so as not to diminish Academy training standards. Significant time is required to train an electronic technician to proficiency in maintaining Academy systems. New hires from specialized vocational and technical training programs (such as the electronic technician program at Tinker Air Force Base) require approximately 3 years of training to reach proficiency. Approximately 2 years are required to train experienced technicians hired from the Logistics Center, Academy, or Field Maintenance work forces.

While the requirements indicate the need for a large number of additional personnel over the next 4 years (60), it should be noted that the Aeronautical Center and Academy Maintenance Support Branch cannot recruit, hire, and train this many technicians at one time. The number of technicians needed in FY93 (39) alone may overwhelm the personnel system. Therefore, the Academy Maintenance Support Branch has two functional human resource policy and programs to put into place:

- The first is to continue to request significant contract support funds so that a sizeable portion of the requirements can be met quickly without over burdening the personnel and training system. A goal of 25 percent of the additional FTE requirements between FY92 and FY98 should be met with contract support.

- The second program/policy is that, once additional personnel are authorized, only 10 new electronic technicians will be hired every 2 months (up to the ceiling) rather than trying to hire the whole group at one time.

Management Actions

The Academy Maintenance Support Branch sees the need for three primary management actions to improve its human resource planning process and better justify its budget and personnel requests. These are to:

- Work with the Academy to get more accurate estimates of the systems to be maintained (including those to be decommissioned) for a 5 year planning window;

- Convert the three methods for projecting requirements into a single approved staffing standard under the authority of an Aeronautical Center Order. This standard will support the Aeronautical Center budget office by providing requirements that are generated through a systematic and accredited process; and

- Develop more detailed availability profiles for each section using additional information on gains, losses, and pipeline durations.

TRAINING SYSTEMS SECTION

Introduction and Scope

The Training Systems Section performs the functions of computer and software support of centralized training programs including the Academy, RTF, and Flight Service training programs. Areas of support include systems analysis and design, operations, software development and maintenance, project management, and planning and training. Systems currently supported include Phase Xa, IIDS, *Tower Operator Training System* (TOTS), *Enhanced Debrief Station* (EDS), *Instrument Flight Rules* (IFR)/2D, *Weather Message Switching Center* (WMSC) Service A, NADIN Service B, and Terminal Driven Testing. The section is organizationally located in the Data Services Division of the Aeronautical Center and is staffed with computer systems analysts, computer systems programmers, computer specialists, and computer operators.

Planning Process

Human resource planning efforts at the Aeronautical Center in the past have not involved the Training Systems Section because of the indirect impact of the NAS modernization on the organization. The section currently determines human resource needs based primarily on Academy support requirements for computer-based ATCS training systems. Other data sources used in the Training Systems Section planning process include skill sets needed to meet project requirements, including system analysis and design, system management, network management, programming, operational support, and administrative support, as well as the available pool of resources to meet skill set requirements, such as FTE staff, contractors, hired skills, or trained skills. Academy priorities, Academy funding levels, and availability of *Government Furnished Equipment* (GFE) influence the Training Systems Section HRM planning process.

Human resource planning efforts at the Aeronautical Center will be expanded to include organizations which have been indirectly impacted by the NAS modernization. Early emphasis will be placed on the Training Systems Section since the functions of the Academy are directly impacted by the automation support provided by this section. Figure 5-4 presents the Training Systems Section HRM planning process.

Modernization Requirements

During the FY94-98 time frame, the Academy AT Branch will be impacted by the following new systems: ISSS, ACCC, TCCC, and TAAS.

It is not known at this time what level or type of support will be needed by the Academy for the above mentioned NAS/AAS training systems. It is assumed at this time that contractors will be providing the implementation and initial support of the NAS/AAS training systems. It is anticipated that the Training Systems Section will be called upon to provide operational and logistics support during the FY94-98 time frame. Until such time that the Training Systems Section is provided with detailed project support requirements for the NAS/AAS training systems, the section will be unable to project resource requirements. Anticipated levels of support may be expanded to include systems analysis and design, software development and maintenance, and project management, depending upon the requirements provided.

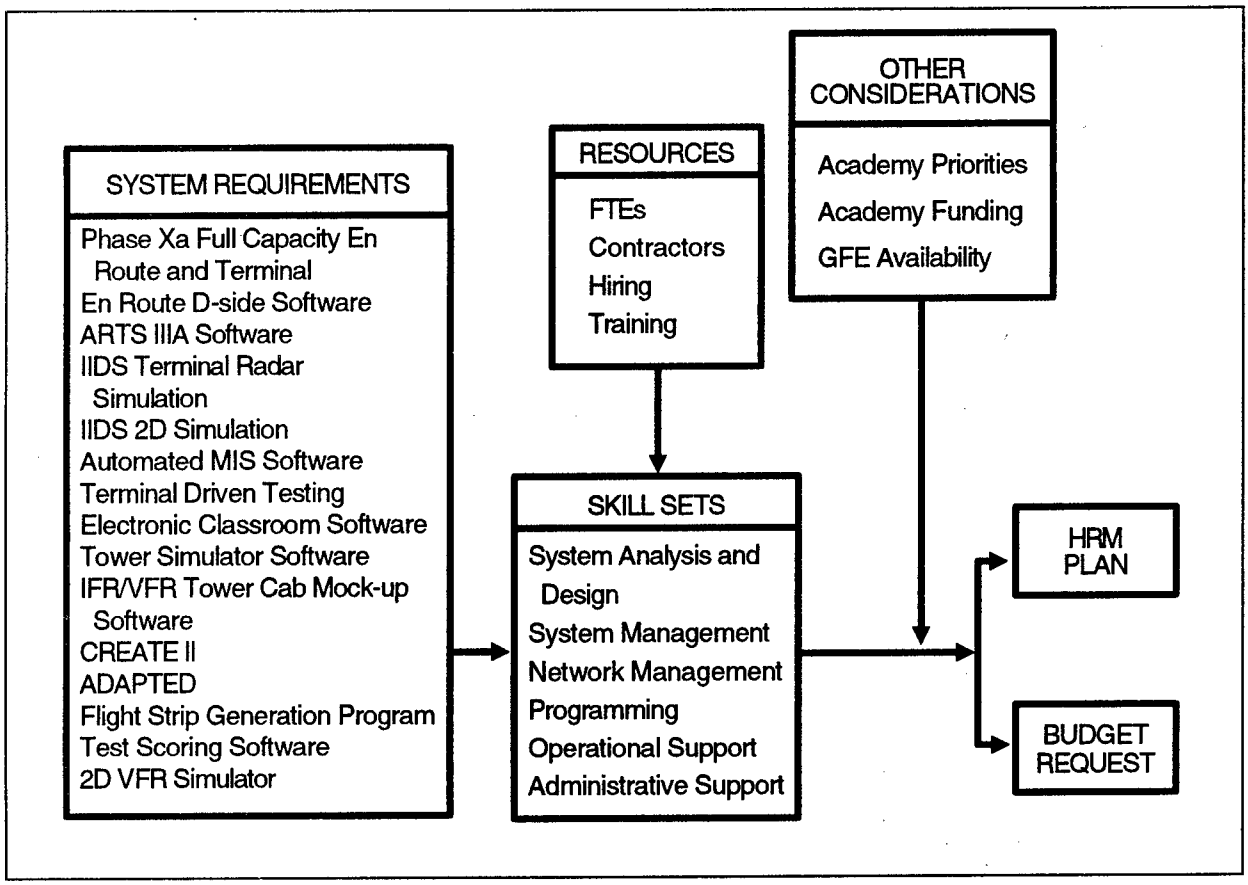


Figure 5-4. Training Systems Section HRM Planning Process

Approach for Providing Resources

The Training Systems Section projects that the resources needed to support the above projects will not be available with existing resource levels. Additional resources for operational and logistics support would be provided from increased FTE levels and computer hardware/software contractors.

Strategies for HRM planning are currently under development by a team evaluating AT training requirements for the Academy. This team includes representatives from the AT Branch, Academy Maintenance Support Branch, Technology and Telecommunications Branch, and the Budget Division. It is hoped that the efforts underway by this team will lay the ground work for a more meaningful HRM planning process. The Training Systems Section is a service organization, serving the Academy in meeting its training systems needs. To properly plan for human resources, the Training Systems Section needs knowledge of specific tasks that the Academy wishes to accomplish with the use of automated training systems. Identifying specific tasks, securing proper funding, evaluating maintenance issues, and determining availability of the proper computer skill sets will be vital to the Training Systems Section HRM planning process.

CHAPTER 6: AIRWAY FACILITIES

INTRODUCTION AND SCOPE

Strategic HRM within the AF organization is a process that requires annual updating of workload estimates associated with maintenance and modernization of the NAS, as well as annual updating of plans for providing for the availability of journey-level capacity for operating and maintaining the NAS. Based upon updated assumptions, this chapter will expand well beyond the scope of the initial AF chapter of the 1990 NAS HRM Plan. Staffing requirements estimates for maintenance of the system and implementation of CIP projects scheduled during the period of FY92-96 will be presented as OPS and F&E workload estimates.

The additional years of FY92-93 are provided as a basis from which future human resource requirements and availability analyses are estimated. However, these requirements and availability analyses may change if the human resources are modified in FY92 and FY93. For AF OPS planning, estimated availability and requirements (though less accurate) are also shown for FY97 in order to ensure that longer range trends are taken into account and do not conflict with the FY96 plans.

The scope of this analysis will include OPS and F&E personnel requirements. OPS personnel requirements include only the 80 operating AF sectors, (i.e., field maintenance personnel at the sector level) including both sector support and direct work staffing. The F&E HRM analysis will include F&E personnel required for the nine FAA regions. Tenant organizations located at the Technical Center and Aeronautical Center will not be included. The analysis will provide a discussion of progress toward integrating human resource planning processes within AF, a comprehensive description of methodologies for estimating staffing requirements, updated human resource availability data, and refinements to management approaches for providing resources.

OVERVIEW OF PLANNING PROCESS INTEGRATION

AF planning processes for both OPS and F&E are designed to:

- Determine staffing needs;
- Examine alternatives for addressing those needs;
- Facilitate optimal decision-making; and
- Seek budgetary actions to support those decisions.

Figure 6-1 presents a general overview of the total AF HRM planning process.

Major assumptions which guide the requirements planning processes are briefly summarized as follows:

- The AF sector level staffing standard is developed for average personnel and includes workload for a mix of both developmental and journey-level personnel.

- It takes approximately 3 to 5 years for new hires to progress completely through the pipeline to journey-level.

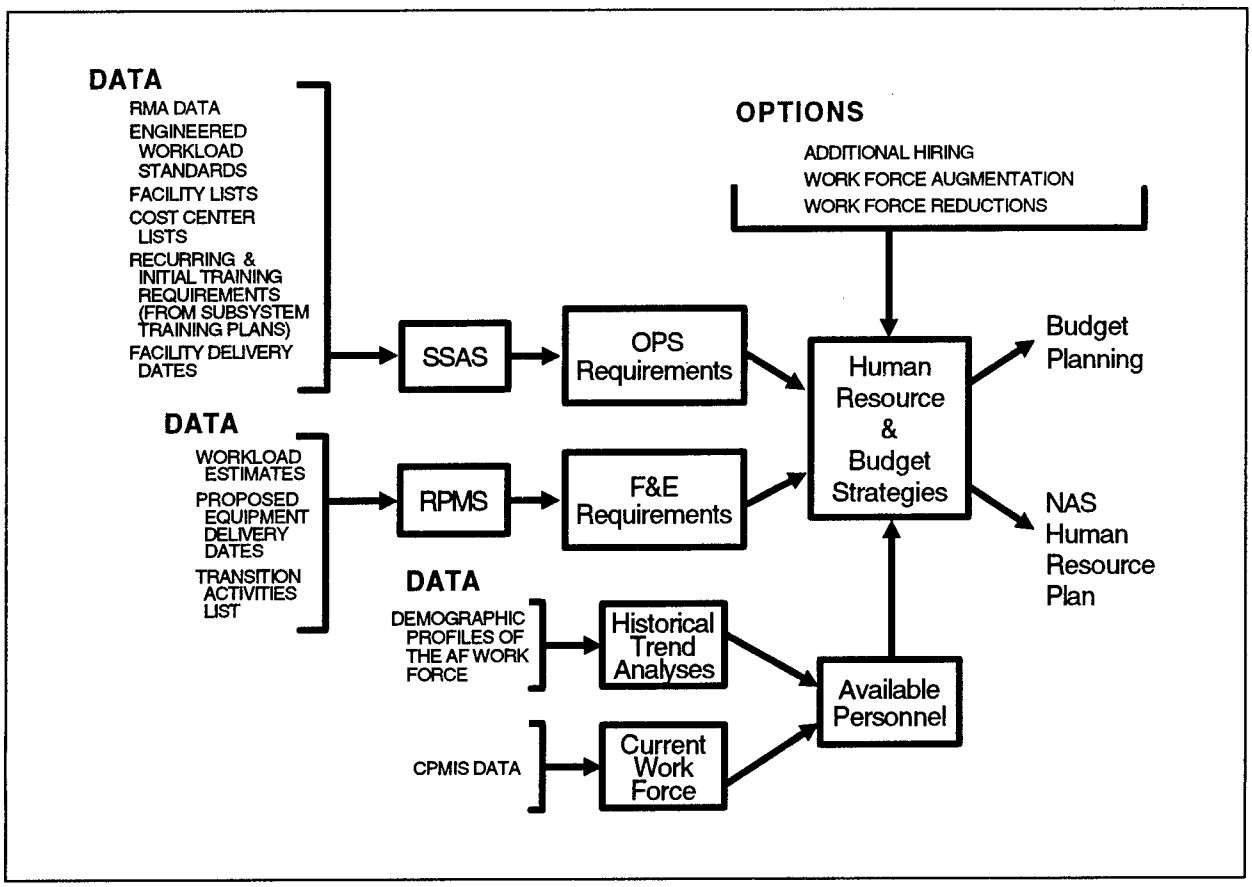


Figure 6-1. AF HRM Planning Process

- There is a continuous process of hiring and progressing through the training pipeline into journey-level ranks (i.e., what comes out of the pipeline is equal to what was put into the pipeline).
- Attrition occurs predominantly from the journey-level ranks.
- Future attrition estimates are based upon projected retirements plus other separations. Projected retirements are assumed to occur within 3 years after each employee becomes eligible for retirement, and other separations are based upon historical trends.
- Commissioning dates for CIP projects, which are estimated from scheduled activities leading up to commissioning, are integrated into both F&E and OPS planning processes. Thus, the F&E and OPS resource estimating processes are linked by use of anticipated commissioning dates for new equipment as derived from forecasted equipment delivery schedules.
- Units of measurement for all human resource data are presented in FTEs. FTEs are defined as full-time-equivalent employee-years which equal 1,770 productive labor hours for OPS, and 1,792 productive labor hours for F&E. An FTE of workload can be covered by a full-time-permanent employee who is employed for the entire year or by a mix of other-than-full-time-permanent employees equaling the effort of full-time-permanent employee employed for an entire year.

Specific human resource planning processes for the OPS and F&E components of the AF work force will be further defined in greater detail throughout this chapter.

HUMAN RESOURCE REQUIREMENTS

AF workload estimates are divided into two parts: F&E and OPS.

F&E Human Resource Requirements

Based upon the May 1991 MDFM, total F&E human resource requirement projections rounded to the nearest FTE are presented in Table 6-1.

Table 6-1. AF F&E Human Resource Requirements

	FY92	FY93	FY94	FY95	FY96
Direct Requirements	2,316	2,717	2,602	2,103	1,461
Indirect Requirements	458	527	580	555	614
Carry-Over from Prior Year	0	866	1,812	2,748	3,370
Total F&E Requirements	2,774	4,110	4,994	5,406	5,445

Notes: Requirements in FTEs (1,792 productive labor hours per year).

Regional Project Management System (RPMS) generated requirements identify work necessary for engineering, installation, and testing of new facilities and equipment. Direct requirements represent F&E workload required for F&E installations. Indirect requirements are additional workload not specifically associated with F&E project activities such as related administrative work, travel, and training workload. Carry-over is the surplus or shortfall from the previous year. Project requirements were entered into the RPMS by each region using resource codes to identify type, cost class, and sources of personnel associated with specific tasks and activities. Subsequent validation of those F&E staffing estimates was based upon statistical analysis. A national average of staffing estimates for each project was calculated and compared to each regional average for each project. When regional averages were found to deviate significantly from the national average, those regions were contacted by FAA Headquarters for further validation of the estimates, and appropriate adjustments were made.

It is generally acknowledged that staffing standards similar to those used for the OPS work force are costly and, therefore, not appropriate for estimating short-lived F&E workload. However, an alternative technique that provides staffing prototypes to RPMS users in each region encourages a considerable degree of standardization while each region retains the flexibility to use, modify, or not use the prototypes, as appropriate.

The FY92-96 F&E staffing estimates and workload analyses by region are presented in Appendix B, Table B-1.

Operations Human Resource Requirements

The OPS requirements include workload for operating and maintaining equipment, as well as nonrecurring start-up and implementation workload required on new equipment. All these requirements are based upon application of the AF staffing standard. The AF staffing standard is engineered by a combination of:

- Hands-on time required for periodic and corrective maintenance;
- Auxiliary tasks and nonrecurring transition tasks, combined with personal and administrative allowances;
- Shift coverage;
- Actual travel requirements;
- Recurring training;
- Leave and holiday allowances; and
- Additional support staffing at the sector level.

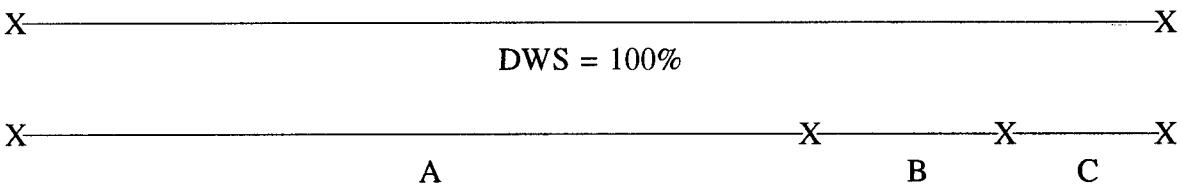
The workload values are based upon direct observation during required task exercises at representative facilities and engineering estimates for future facilities (AF Sector Level Staffing Standards System, Order 1380.40C). When new facilities are added to the system, engineering estimates are used until study data become available. The workload values are developed for each facility identification code, type, and class, and have been established utilizing appropriate industrial engineering techniques. The workload values are periodically reviewed and updated as changes in equipment or procedures occur. The Staffing Standard Change Control Team (chaired by ASM-200 with representatives from the field and program offices) reviews all proposed changes to existing workload values and all new workload values planned to be introduced into the staffing standard system. Changes which are not agreed upon by all team members are referred to the Associate Administrator for AF for a decision. Changes are then made on a national basis to the Staffing Values File database which forms the basis for the AF automated workload estimator, the *Staffing Standards and Analysis System* (SSAS).

The basic algorithm for the *Direct Work Staffing* (DWS) portion of the OPS staffing estimates is presented in Figure 6-2.

The SSAS system takes the workload values and combines them with cost center code tables and facility inventory lists to produce and project staffing estimates (including allowances) down to the facility level. To the DWS, the SSAS system adds the needed support workload (program support, technical support, and engineering management and administrative support). These support staff calculations utilize workload units based upon sector type and size (i.e., an appropriate number of core people plus an amount per hundred technicians is added to the DWS calculations). The AF staffing standard currently covers the field maintenance subpopulation of the AF work force. FAA Headquarters and Regional Office personnel are not included, although a Regional Office staffing standard is in the process of being developed.

The OPS requirements were based upon MDFM delivery dates, RPMS commissioning dates, and staffing standards workload estimates which were up-to-date as of the fourth quarter of FY91. As determined by the AF Sector Level staffing standard, the workload for in-house direct work staffing, by system, is shown in Appendix B, Table B-2.

Total operation workload for in-house staffing also includes sector support staffing. Adding sector support staffing and arraying this workload by region results in the following workload, presented in Table 6-2.



DWS = Direct Work Staffing
A = Total On-the-Job Time (79.1 percent of DWS for ARTCCs and 81.22 percent for The NAS)
B = Leave (14.9 percent of DWS)
C = Recurring Training (6 percent of DWS for ARTCCs and 3.88 percent for The NAS)

Where A = 1.315 (Direct Work)* + Travel Allowances
Direct Work = preventative and corrective maintenance, auxiliary maintenance, non-recurring and centralized maintenance

* NOTE: The .315 accounts for documentation and personal allowances for 8 1/2 hour shift personnel only. For 8 hour shifts, A = 1.39 (Direct Work) + Travel Allowances

Figure 6-2. Direct Work Staffing Algorithm

Table 6-2. AF Total In-House Operations Workload

Region	FY92	FY93	FY94	FY95	FY96
AAL	524	505	504	512	522
ACE	723	731	743	776	762
AEA	1,453	1,410	1,409	1,407	1,417
AGL	1,673	1,682	1,687	1,699	1,694
ANE	559	551	553	607	577
ANM	1,223	1,279	1,303	1,291	1,290
ASO	2,438	2,352	2,350	2,336	2,411
ASW	1,563	1,562	1,600	1,578	1,580
AWP	1,617	1,646	1,668	1,689	1,691
Total	11,773	11,718	11,817	11,895	11,944

Notes: Requirements in FTEs (1,770 productive labor hours per year).

Workload not included in the staffing standard, and which is expected to be accomplished by contract with *Original Equipment Manufacturers* (OEM) is presented in Table 6-3.

Table 6-3. AF OEM Workload

	FY92	FY93	FY94	FY95	FY96	FY97
OEM	255	430	591	786	876	1,092

Notes: Requirements in FTEs (1,770 productive labor hours per year).

Total OPS workload, then, is the sum of both, as presented in Table 6-4.

Table 6-4. AF Total Operations Workload

	FY92	FY93	FY94	FY95	FY96	FY97
In-house	11,773	11,718	11,817	11,895	11,944	12,100 (est.)
OEM	255	430	591	786	876	1,092
Total	12,028	12,148	12,408	12,681	12,820	13,192

Notes: Requirements in FTEs (1,770 productive labor hours per year).

AVAILABILITY OF RESOURCES

Once workload requirement estimates are obtained, personnel availability must be determined. At a national level, availability estimates are produced from the CPMIS. In order to match calculations with the workload estimates, all availability analyses and projections focus on the field maintenance subpopulation.

OPS and F&E work forces are considered two separate staffs at this time. OPS personnel report directly to the sectors in which they work, while F&E personnel report to the 400 Division of the Regional Offices. F&E workers often are hired into OPS positions after gaining some basic FAA experience. Their replacements come from outside the FAA and must proceed through appropriate training courses before being qualified to perform their assigned duties.

Availability of F&E Human Resources

Projected resource availabilities rounded to the nearest FTE are presented in Table 6-5.

Table 6-5. AF F&E Availability					
	FY92	FY93	FY94	FY95	FY96
Available FAA Staffing	1,272	1,382	1,492	1,602	1,712
Available TSSC Staffing	402	722	691	507	369
Available Other Contracts	234	194	173	147	135
Total Available Resources	1,908	2,298	2,356	2,256	2,216
Total F&E Requirements	2,774	4,109	4,992	5,405	5,445
(Shortfall)	(866)	(1,812)	(2,636)	(3,149)	(3,229)
Statistical Adjustment	260	543	791	944	969
(Remaining Requirements)	(606)	(1,269)	(1,847)	(2,205)	(2,260)
Notes: Availability in FTEs (1,792 productive labor hours per year).					

Expected availability projection formulas were provided to all regions by the *F&E Resource Branch* (AAF-12) for input into RPMS. PLDs were assumed to vary depending upon the type of staffing under analysis. Contractors were assumed to work 245 days per year, and the FAA estimates 224 PLDs each year for each F&E employee based upon average patterns of leave usage and the known experience level of the F&E work force. For the purposes of this analysis, available FAA staffing is assumed to increase approximately 100 positions per year as recent budgets have yielded. *Technical Services Support Contract* (TSSC) staffing was assumed to be available as required (i.e., TSSC availabilities equal TSSC requirements). The category of "other available contracts" includes Architectural and Engineering contractors, and F&E LOE work to be performed by the SEIC and DOD. A statistical adjustment was applied to address historical trends of projects that have not been fully funded due to budget shortfalls.

Availability of Operations Human Resources

Journey-level AF OPS personnel complete the majority (i.e., 65 to 70 percent) of the OPS workload requirements. At this time, developmental personnel represent approximately 22 percent of the total field maintenance work force. The bulk of the developmental personnel's time is consumed by training. However, developmentals work on some equipment and assist journey-level personnel when they are not in training.

Retirement and attrition assumptions for the OPS work force are based upon historical trends as shown in the **Demographic Profiles of the Airway Facilities Work Force**. Recent analyses of these trends shows that approximately 30 percent of those individuals eligible to retire actually leave the organization each year. An additional 2 percent of the remaining work population is expected to attrit. For planning and projection purposes, retirements and attritions are assumed to only occur in the journey-level ranks. Developmentals usually graduate to journey-level status before attriting.

AF had very well-seasoned and cross-trained journeymen, with above average experience, through many previous fiscal years. After a period of not backfilling for attrition, in FY87 AF restarted the movement of new personnel through the developmental levels and into the journey-level ranks. However, AF is now

expecting a temporary low level of work force experience as many more very experienced journey-level personnel attrit and are replaced by developmental personnel who will require a 3 year lag to progress to the journey-level. Additional journey-level work force augmentation is therefore being planned until a higher AF experience level can be built. These additional contract resources will provide journey-level assistance which will allow for maintaining the current system, while simultaneously accomplishing new in-house technician training to meet future maintenance requirements. This will be done while meeting the system integration demands for new equipment being installed during the FY94-96 time frame.

In-house journey-level and total in-house resource availabilities are determined as presented in Table 6-6.

Table 6-6. Total In-House Operations Availability

	FY92	FY93	FY94	FY95	FY96	FY97
Retirements	408	482	500	500	500	500
Other Attrition	344	326	229	184	150	100
Total Attrition	752	808	729	684	650	600
Hires Above Attrition	89	380	286	171	(143)	(48)
Total New Hires	841	1,188	1,015	855	507	552
Developmental Pipeline:						
1st Year	1,031	841	1,188	1,015	855	507
2nd Year	765	1,031	841	1,188	1,015	855
3rd Year	798	765	1,031	841	1,188	1,015
Additions to Journey-Level	587	798	765	1,031	841	1,188
New End-of-Year Journey-Level Base	7,049	7,039	7,075	7,422	7,613	8,201
End-of-Year Employees	9,160	9,540	9,826	9,997	9,854	9,806

Notes: Availability in FTEs (1,770 productive labor hours per year).

To FY91 *End-of-Year* (EOY) employment of 9,071, attrition of 752 is subtracted and total new hires of 841 are added to yield 9,160 for EOY FY92. The FY92 EOY employment of 9,160, attrition of 808 is subtracted and new hires of 1,188 are added to yield 9,540 for EOY FY93 employment. To the FY93

EOY employment of 9,540, attrition of 729 is subtracted and new hires of 1,015 are added to yield 9,826 for EOY FY94 employment, and so forth.

Similarly, to the FY91 EOY journey-level employment of 7,214, losses equaling the attrition of 752 are subtracted and gains of 587 emerging from the training pipeline in FY92 are added to yield 7,049 for FY92 EOY journey-level employment. To the FY92 EOY journey-level employment of 7,049, losses of 808 are subtracted and gains of 798 are added to yield 7,039 for FY93 EOY journey-level employment. To the FY93 EOY journey-level employment of 7,039, losses of 729 are subtracted and gains of 765 are added to yield 7,075 for FY94 EOY journey-level employment, and so forth.

The 841 new hires entering the training pipeline in FY93 emerge as journey-level in FY96 after spending 3 full years in the training pipeline. The 1,188 FY93 new hires enter the training pipeline in FY94 and emerge as journey-level in FY97. The 1,015 FY94 new hires enter the training pipeline in FY95 and emerge as journey-level in FY98, and so forth.

Note: The estimated resource availabilities are based upon hiring projections contained in the *Office of the Secretary of Transportation* (OST) budget submission for FY93, which was available from AAF-13 on December 13, 1991. Additional availability comes from modest increases in overtime accomplished by journey-level personnel. Large increases in planned overtime usage have been avoided so that a reserve personnel resource buffer can be maintained should any unexpected operational problems develop.

In-house journey-level capability is expected to decline relative to workload until FY95 because new employees require an average of 3 full years to progress to the journey-level. The infusion of journey-level contract resources through use of journey-level work force augmentation, combined with OEM contract maintenance, however, reverses the decline early in FY93 as presented in Table 6-7.

Table 6-7. Total Journey-Level Operations Availability

	FY92	FY93	FY94	FY95	FY96	FY97
In-house	7,049	7,039	7,075	7,422	7,613	8,201
OEM	255	430	591	786	876	1,092
Overtime	90	100	110	120	130	140
Journey-Level Work Force Augmentation	0	60	556	377	267	0
Total Journey-Level	7,394	7,629	8,332	8,705	8,886	9,433

Notes: Availability in FTEs (1,770 productive labor hours per year).

Total availability (journey combined with developmental levels) actually declines in FY96 while journey-level availability increases as presented in Table 6-8.

Table 6-8. Total Operations Availability					
	FY92	FY93	FY94	FY95	FY96
In-house	9,160	9,540	9,826	9,997	9,854
OEM	255	430	591	786	876
Overtime	90	100	110	120	130
Journey-Level Work Force Augmentation	0	60	556	377	267
Total	9,505	10,130	11,083	11,280	11,127
Notes: Availability in FTEs (1,770 productive labor hours per year).					

BUDGET PLANNING PROCESS

The AF Resource Staff (AAF-10) takes input from the OPS and F&E workload requirements and personnel availability analyses and pulls them together into an integrated budget submission. At this time, AF looks at national-level requirements and availability in order to estimate potential shortfalls in staffing. Shortfalls exist when AF does not receive enough funding to hire all of the personnel requested. (For example, AF requests a percentage of the OPS staffing standard. The number of OPS personnel requested is usually a lesser number than 100 percent of the OPS staffing standard because the staffing standard is a benchmark based upon time needed by average technicians to complete each task. Many of the AF field personnel have been on the job for many years and have experienced levels that are above average. Therefore, less than 100 percent of the staffing standard is requested. The amount requested, however, is also rarely received.)

Even with less staffing, AF has consistently maintained the equipment and services in an available state for the ATCSs and pilots. Equipment and service availability has been, and continues to be, very high (99.8 percent). AF has so far been able to perform its safety-related maintenance duties with less than the requested percentage of the staffing standard. Until now, this has been possible in the short term due to deferring short term non-safety-related tasks such as transition assistance activities and longer term training for accomplishing future maintenance. In the short term, there are fewer outages and fewer delays to AT. A change in the future availability of equipment and services, however, would have a significant impact on the private sector. While increasing availability would reduce private sector expenses by hundreds of millions of dollars in fuel and productive business time, decreasing availability would have the opposite effect. Decreasing equipment and service availability below an acceptable level could also, in all probability, deteriorate the public confidence in air safety, reduce air travel, and impact business in the private sector substantially more. And there are some signs that compel the AF organization to act now in requesting resources for increasing maintenance staffing (i.e., experience level of maintenance personnel is decreasing, on-site overtime is increasing, needs for second-level engineering support are increasing, and backup system failures which are transparent to the customer are increasing, and AT is tolerating more lengthy outages).

Since significant shortfalls still exist, more options are being developed by the AAF-10. First, AF national management attempts to provide for contractor maintenance support on all or parts of a new systems at the time the procurement contract is written. Ways of meeting additional shortfalls then proceed with reallocation of duties or personnel to areas where effort is needed the most. When training cannot be deferred and the option exists, many sectors require technicians to take by-pass exams and correspondence courses to meet training requirements. In this manner, they can fulfill their training needs and still contribute to the workload requirements. During more critical periods, FAA Headquarters can request an increase in personnel authorizations and funding for support contracts such as for journey-level work force augmentation.

Any additional support needed must be resolved by each region and sector. Many regions have reallocated funds in order to obtain their own maintenance support contracts. Regions have also distributed personnel authorizations so that locations experiencing heavy amounts of unmet transition workload requirements can accomplish their transition activities in a timely manner. Sector managers can in turn exercise options such as choosing to reduce watch coverage or defer non-safety related modifications or documentation activities.

Whatever measures are used to meet workload requirements, the AF work force is committed to maintaining the AT system at the highest level possible. As new human resource planning technology and methodologies become available, better strategic planning will evolve and potentially enable coping with lower staffing levels. For example, options such as accelerating maintenance control center watch coverage, reducing periodic maintenance, or reducing high cost contract maintenance may be considered.

The F&E Planning Process

The F&E workload requirements are based upon the RPMS. RPMS consists of several modules, two of which are the *Personnel Resource Module* (PRM) containing personnel workload estimates and the MDFM containing projected facility delivery dates. The process of developing estimates is based upon a project-by-project analysis of recurring transition and implementation work activities scheduled within each region. These activities include, but are not limited to, budget and site planning activities, project management support, engineering specification tasks, site preparation, F&E training, installation and checkout, testing and certification, joint acceptance inspections, commissioning of the new equipment, and decommissioning of the old equipment.

Since F&E workload involves systems yet to be fielded, the transition workload values are engineering estimates. Prototype RPMS networks have been supplied to all regions. These prototypes represent national engineering estimates for all possible activities for each system. Each region has been directed to update and/or change these activities and estimates, as appropriate, to reflect the systems to be implemented and activities to be conducted in that region. FAA Headquarters management staff then use these prototype estimates, with all changes and appropriate delivery schedules, to project transition (F&E) workload requirements into the future.

The Operations Planning Process

The AF staffing standards, a zero-based budgeting tool, are used for assessing OPS workload required to maintain the NAS. The staffing standards are based upon the amount of time required to maintain each piece of equipment as applied to the expected inventory of equipment which will comprise the NAS in each future year. The OPS planning process begins with the annual application of the AF staffing standard for field maintenance. This involves capturing the existing inventory of equipment as well as

the future changes (commissionings and decommissionings). Each region then applies this inventory to nationally determined staffing values to project their workload.

The staffing standards estimate the amount of workload that should be required of average maintenance mechanics and electronics technicians. The staffing standards are for in-house workload, less the workload which is not required due to having OEM contract maintenance. The staffing standards include time for in-house personnel to participate in transition activities (for reviewing and developing specifications and design drawings, planning site preparation, coordinating work, monitoring work, inspecting/assuring quality, and monitoring *Joint Acceptance Inspections* [JAIs] and JAI exceptions). The staffing standards also include a training pipeline and time for new initial training. The AF staffing standards assume average technicians working at average pace, and thus account for an average mix of developmental and journey-level maintenance personnel. Therefore, the staffing standards must be applied with judgment based upon the expected experience levels of personnel. While staffing levels lower than the staffing standard were requested in prior periods, AF is now requesting staffing at levels closer to those generated by application of the staffing standard for future periods. AF estimates requesting resources for as much as 90 percent of the total staffing standard generated workload during the FY94-95 time frame, when the experience level of its in-house personnel will be very low. This 90 percent level is deemed appropriate based upon planned improvements, which will shorten the training period and reduce time required to be spent on training, as well as based upon future potential management improvements.

Since the staffing standards are for in-house workload, total workload is calculated by adding the employee-years of effort required by OEM contractors to in-house workload. Availability or capability to accomplish journey-level workload is then estimated and needs for additional direct infusions of short term journey-level contract resources are determined. This results in plans for a mix of contractor and in-house resources to accomplish the total OPS workload requirements.

The NAS Modernization Projects

The CIP defines the NAS equipment which will be established and maintained. Several important projects affecting the amount of staffing which will be needed in FY96 and beyond include *Remote Maintenance Monitoring* (RMM), Mode S, VSCS, AAS, and MLS. For example, MLS and ILS will be maintained together for a period of 5 to 10 years. This means that not only will there be an increase in day-to-day maintenance operations but there will be a start-up resource required of OPS personnel as well as a significant F&E resource requirement to install the MLS. Resources for MLS will be required during a period in which the VSCS, AAS, and Mode S projects are also being implemented. MLS alone will require an 80 employee-year OPS effort in the FY96 period above and beyond other workload requirements. This builds to an additional 300 employee-year OPS requirement within 4 years, even before decommissioning of ILS systems begins.

Eventually, RMM will allow AF to monitor equipment such as ILSs and *Airport Surveillance Radars* (ASRs) from a central *Maintenance Control Center* (MCC) location and reduce on-site watch standing coverage requirements while reducing outages. MCC development is planned to proceed from a manual coordination process to full automated monitoring over the next 3 to 5 years. However, in the intermediate term increases in the number of systems requiring dual maintenance for safety and efficiency purposes (e.g., CD-1 and CD-2, MLS and ILS, etc), as well as added new equipment and services, will first increase workload above original projections, before the decreases begin. The new equipment and services which will increase workload include TDWR, AWOS, as well as other facilities (e.g., *Airport Traffic Control Tower* (ATCT), ARTS, ILS, ALS, *Visual Approach Slope Indicator* [VASI], *Distance Measuring Equipment* [DME], *Uninterruptible Power System* [UPS]) which are required for new airports,

Airport Improvement Program (AIP), non-Federal facility takeovers, and military base closures. Many of the non-Federal facility takeovers and military base closures will involve maintaining an increased number of facilities which are still of the older technology.

All of these projects, as well as all other projects, are factored into the OPS and F&E planning processes. In addition, technical details concerning individual projects can be reviewed by referring to the CIP.

APPROACH FOR PROVIDING RESOURCES

Approach for Providing F&E Human Resources

The primary approach for providing human resources for F&E work will be to continue supplementing FAA staffing through use of the Technical Support Services Contract and other contractor resources. To the maximum extent feasible, remaining requirements will continue to be met through new hires, overtime use, rehired annuitants, and additional contractors. However, human resource shortfalls resulting from insufficient budgetary allocations sometimes unavoidably result in delays to implementation schedules and carry-over of remaining workload requirements to subsequent years. Table 6-9 presents the FAA approach for providing regional F&E resources.

Table 6-9. Approach for Providing F&E Human Resources

	FY92	FY93	FY94	FY95	FY96
Direct Requirements	2,316	2,717	2,602	2,103	1,461
Indirect Requirements	458	527	580	555	614
Carry-Over from Prior Year	0	866	1,812	2,748	3,370
Total F&E Requirements	2,774	4,109	4,992	5,405	5,445
Available FAA Staffing	1,272	1,382	1,492	1,602	1,712
Available TSSC Resources	402	722	691	507	369
Available Other Contracts	234	194	173	147	135
Total Available Resources	1,908	2,298	2,356	2,256	2,216
(Shortfall) or Surplus	(866)	(1,812)	(2,636)	(3,149)	(3,229)
Statistical Adjustment	260	543	791	944	969
Remaining Requirements	(606)	(1,269)	(1,847)	(2,205)	(2,260)

Notes: Requirements and availability in FTEs (1,792 productive labor hours per year).

Approach for Providing Operations Human Resources

Using the human resource planning process, AF has determined that the effect of hiring more in-house personnel will be to decrease the future total costs of maintenance associated with a mix of in-house personnel and the more expensive journey-level work force augmentation options. Continued inability to hire sufficient in-house personnel, however, results in requests for short-term journey-level assistance from outside sources. (However, investment in the continued high level of maintenance through increased hiring of career civil servants is deemed the most appropriate strategy from a longer term safety and economic cost standpoint.)

Therefore, there are four parts of the combined long-term and short-term HRM strategy being employed in order to combat the relatively low level of OPS work force experience and in order to meet AF needs during the FY94-96 time frame at lowest total cost. These four parts are increased hiring and training of in-house field maintenance personnel to enable future workload accomplishment, temporary augmentation of the field maintenance personnel to meet short-term needs (including use of the provisions contained in the *Federal Employees Pay Comparability Act* [FEPCA] where appropriate and journey-level overtime increases), continued augmentation with OEM contract maintenance as necessary, and future management initiatives to effect efficiencies in training and workload accomplishment.

The approach for providing resources gradually increases the number of in-house journey-level personnel in the AF work force while simultaneously increasing the amount of journey-level workload accomplished as shown in Table 6-10.

Table 6-10. Approach for Providing Operations Human Resources

	FY92	FY93	FY94	FY95	FY96	FY97
Total Workload	12,028	12,148	12,408	12,681	12,820	13,192 (est.)
Total Resources	9,505	10,130	11,083	11,280	11,127	11,038
Total Journey-Level Resources	7,394	7,629	8,332	8,705	8,886	9,433
Percent of Workload Staffed	79%	83%	89%	89%	87%	84%
Percent of Journey-Level Workload Staffed	61%	63%	67%	69%	69%	72%

Notes: Workload and resources in FTEs (1,770 productive labor hours per year).

Figure 6-3 presents the FTEs (in thousands) necessary to meet human resource requirements for FY92-97.

Workload not covered is a result of the application of an average staffing standard to an above average work force, combined with measures designed to cope with obtaining less than requested staffing. Therefore, these estimates acknowledge an above average work force which can meet a workload level which will ultimately be reduced through future management initiatives.

AF management plans to sustain the traditional high efficiency of the AF work force by continuing the practice of hiring and training quality personnel who are far better than average. Whereas the number of

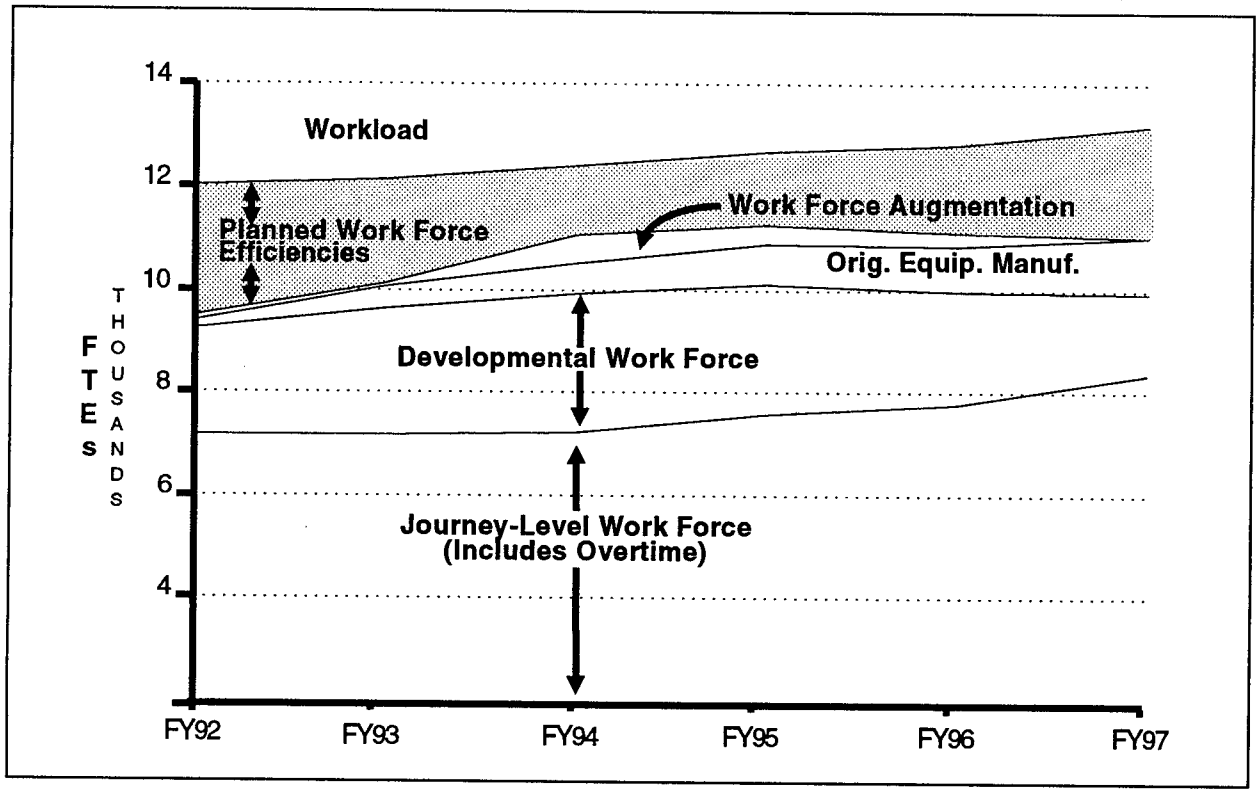


Figure 6-3. Strategy for Meeting AF OPS Human Resource Requirements

field maintenance personnel required under normal circumstances would exceed 10,000, AF has succeeded in attracting quality personnel and providing the training that those personnel have needed to perform exceedingly well. To continue to employ a work force which is better than average and able to work at a faster than average pace, provides for approximately 10 percent of the planned management efficiencies. Additional planned efficiencies are still needed, however, to cope with shortfalls beyond this 10 percent, and are planned to result from advances in hiring, training, and progressing to journey-level through accelerated promotions. Efficiencies may also result from systematic reductions in workload that may result through conducting methods improvement studies of planned periodic maintenance activities and reducing maintenance activities where risk analyses can determine that safety is not a significant factor.

Overview of Progress Since Last HRM Plan

Since the last NAS HRM Plan, the FAA has conducted a comprehensive JTA for the work performed by maintenance personnel and has established a steering committee to review results and identify implementation strategies. This steering committee is composed of FAA Headquarters representatives from ASM-200, *Staffing Policy Division* (APN-200), and AHT, as well as representatives from PASS and the HRM and AF field organizations. The committee is divided into two sub-groups: classification and training. The classification sub-group will review draft position descriptions and qualification standards and make recommendations regarding classification series and grades. The training sub-group will review training course content requirements for 175 courses and recommend modernization of the AF technical training curricula, as well as estimated costs for implementing the recommended changes. These efforts

will provide the FAA with valid and reliable training and will develop individual skills to match the new technological requirements.

Additionally, AF plans to provide progressively improved information to assist AHT in planning to meet training requirements. This information would then be provided by AHT to the Academy to assist in planning to meet all of AF's training requirement. This information is currently in the form of expected number of new hires per year and will be refined to show new hires by specialty and region. Later, actual certification requirements may be used to compare training achieved in the work force to training required. This will enable AF to identify actual courses needed as the organization progresses from budget to current year.

In the area of F&E resource planning, AF has improved the RPMS so that the processing of various date files can be accomplished on a regional basis rather than depending on a central processor system and its inherent longer turn around time. Work has also been concentrated in prescribing a set of assumptions and a set of tasks for each major CIP system installation, to be used by the region in the estimation of the workload impacts of these systems. This standardization will provide a national uniform baseline from which the impact of special conditions (e.g., installation on a mountain top in Alaska rather than in a corn field in Iowa, etc.) can also be estimated. The result will be a more accurate prediction of future F&E workload. The next year will be spent assessing how well the standardization is helping to determine how the standards need to be changed to improve the process. Additionally, AF will be defining enhancements to RPMS which will improve its ability to process the various planning networks and to link to other associated databases. These enhancements will improve AF's ability to track current progress in implementation activities and to better predict future activities.

SUMMARY/CONCLUSIONS

The FAA faces formidable challenges in meeting objectives for maintenance and modernization of the NAS. While the AF data presented in the 1991/92 NAS HRM Plan reflect only a snapshot of projected staffing requirements and availabilities, it is clear that pending additional resource authorizations must be adequate to meet projected future workload requirements. In view of the magnitude and complexity of planned equipment delivery schedules, any reduction in human resources below expected availability levels may translate into further delays in modernization projects. While in some cases those potential delays may present opportunities for mitigation of unmet requirements (e.g., leading to decreased operational and training requirements), in other cases, maintenance requirements may increase due to the operation of older and less reliable equipment.

The AF HRM Plan is directly linked to AF budget requests. This AF HRM Plan is the first step in formulating the FY94 budget request to Congress. Subsequent steps will include refinements as recommended by ABU, OST, and OMB. A balanced combination of the efficient use of existing resources, support of additional human resource requests, and the effective application of strategic planning within AF, will continue to allow the FAA to safely maintain the NAS, minimize potential delays to equipment modernization, and optimize service to the flying public.

CHAPTER 7: AIR TRAFFIC

INTRODUCTION AND SCOPE

This chapter of the 1991/92 NAS HRM Plan addresses the AT human resource planning for NAS modernization. The AT planning process provides information about the management of staffing, training, facility consolidations, and operational procedures and policies necessary to support transition activities. AT human resources for day-to-day ongoing ATC system OPS are determined by the AT Staffing Standard (FAA Order 1100.123C) and are not included in this chapter.

The 1990 NAS HRM Plan focused on three major AAS projects affecting the en route segment of the ATC system. This edition of the NAS HRM Plan provides an update to those projects and introduces information regarding CIP projects for the terminal segment.

Background

Project 56-22 in the CIP provides the focus for human resource requirements planning and management related to NAS modernization. The AT Service has made human resource planning an integral part of the planning processes for the CIP projects that will affect the en route and terminal facilities. To achieve maximum benefit in the shortest period of time, the planning process has concentrated on human resource requirements definition and staffing strategies for the CIP projects in a descending order of impact on the NAS.

En Route Facilities

The 1990 NAS HRM Plan concentrated on the en route option and the human resource requirements anticipated from the implementation and transition of the three largest, most imminent projects to be installed in the ARTCCs: PAMRI, VSCS, and ISSS.

Preliminary data and analysis processes produced an estimate of the LOE, or workload, required for planning, implementation and integration activities of the projects to be installed in the en route facilities. The LOE estimate was constructed from the activity networks prepared by the AAS Implementation Working Group (for the en route projects) and from similar information in the Terminal and GNAS (TAG) Study (developed by MiTech for the terminal projects). Each activity was assigned a number of human resources, by specific skill categories related to AT, in terms of days of effort required to accomplish the activity. Each day equals 8 hours.

To express the LOE in terms of FTEs, the guidance in OMB Circular Number A-11 was adapted: "...the total number of hours (worked or to be worked) is divided by the number of compensable hours applicable to each fiscal year..." Because the amount of effort was collected in terms of days, the days of effort were divided by the applicable number of compensable days for each fiscal year. (Paragraph 13.4 of the Circular provides the number of compensable days per year: for FY92 the number of compensable days is 262; for FY93, 261; for FY94, 261; for FY95, 260; for FY96, 261; for FY97, 261; and for FY98, 261.) The tables throughout this chapter, therefore, show the LOE requirements for AT human resources in terms of FTEs for the implementation and transition activities of each project.

The LOE calculations were prepared in order to express transition requirements in terms compatible with the budget process. The LOE requirements expressed in this chapter do not, however, represent what the budget request may be. The budget requirement has not yet been determined. The LOE of AT human resources required to implement and transition new projects in the ATC facilities presented in this document should be equated to how much work must be done, but should not be equated to staffing.

Defining the LOE established a planning factor upon which to develop strategies for coping with the transition work that must be accomplished. These strategies include, but are not limited to, absorption of the additional work by the existing work force, reallocation of the existing work force to higher priority tasks, and/or hiring additional personnel. For example, training is the major portion of the workload associated with ISSS. This workload will be absorbed by the training contract employees. Strategies will be developed that will ensure that ATCS staffing and training at the ARTCCs is accomplished in time to support the planned implementation and transition activities.

During the past year, AT's HRM planning processes have continued. More current information is being received regarding sector-by-sector transition strategies, transition training plans for subsystems, and national staffing strategies. The information from these plans has been used to update and refine the estimates of human resource requirements. This will be a continuing process.

Terminal Facilities

In the past year, progress was achieved toward applying analytical processes to the challenges of the terminal option (more than 400 facilities). These processes are similar to those used to define the transition requirements for human resources at the 20 facilities of the en route option. Twelve CIP projects affecting ATCTs and *Terminal Radar Approach Control* (TRACON) facilities operated by ATCSs were studied. An order estimate of the LOE or workload required to achieve implementation and transition of these terminal facility-related projects is included in this chapter.

Summary

Data reflected in the 1990 NAS HRM Plan have been refined throughout the past year. More precise estimates of human resource requirements have been prepared for the en route facilities. Further analysis of en route facility training program capacity has been accomplished.

The continuing preparation of subsystem training plans for individual CIP projects has clarified both training objectives and training delivery. Development of proposals for revising the recruiting, hiring, screening, training, and assigning processes of ATCSs has continued.

Analyses of CIP projects contributing to modernization of the terminal ATC facilities began this year. These analyses are more complex than those conducted for the en route facilities. Unlike the standardization found in the architecture and equipment of the 20 en route facilities, the terminal facilities vary significantly in terms of:

- Building configuration;
- Equipment;
- Communications requirements and capabilities;
- Numbers and placement of console operating positions;
- Numbers of AT OPS and staffing requirements; and
- Hours of operation.

The analytical processes that have been applied to all of these elements have enhanced the ability of the AT Service to more fully integrate HRM into the NAS modernization program.

AT HRM Planning Process

There are four major components of the AT HRM planning process:

- First is the ability to accurately assess the availability of the human resources in, or approved for inclusion in, the AT work force;
- Second is the ability to forecast the LOE requirements to which resources must be applied;
- Third is a management analysis capability assuring adherence to strategic departmental and agency guidance and goals; and
- Fourth is the ability to obtain critical feedback for input into the planning process.

The AT HRM planning process is depicted in Figure 7-1.

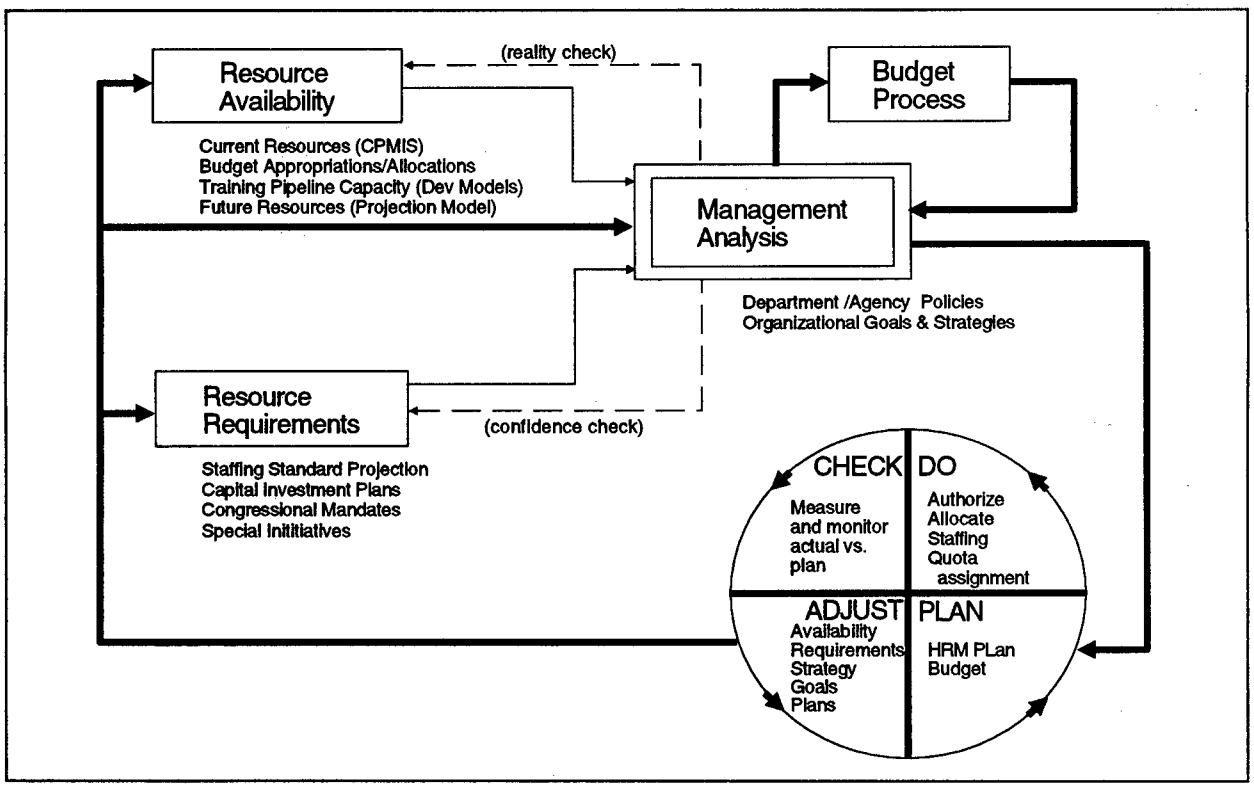


Figure 7-1 AT HRM Planning Process

Briefly, the process centers on management analysis of resource availability versus resource requirements. Resource availability data are derived from the CPMIS, training and development program capacity models and management databases, budget cycle documents, and AT OPS management information. Management

subjects this information to periodic reviews to confirm, for example, appropriations support for planned levels of training capacity.

Resource requirements for ongoing OPS are derived from traffic projections and staffing standards. Future OPS LOE requirements are influenced by CIP project information, safety related position requirements, developments in the airport grants program, international agreements pertaining to ATC systems and operations, congressional mandates in appropriations bills, and *Research and Development* (R&D) programs. Management subjects this information to confidence checks to gauge, for example, the probability of new technology in the R&D arena progressing in time to meet projected traffic demands.

This management analysis is conducted with understanding and appreciation of DOT and FAA strategies and organizational goals. Along with the interactions between the people responsible for operations, requirements definitions, and resource program management, this analysis brings together:

- Trend information;
- Past experience;
- Adequacy of policy, procedures, and practices;
- Requirements for career development and training of the work force; and
- Accident/incident analyses.

The management analysis process continually stimulates the "plan, implement, check, adjust" sequence of management activities. The NAS HRM Plan and budget estimate submissions (e.g., plans, etc.) become formal statements of near, intermediate, and long-term goals that are achievable, measurable, and time-limited. Authorizing and allocating resources to accomplish the plans establishes the energy to carry out the plans. Periodic, compulsory checking of the achieved results against the planned objectives helps identify the adjustments that may be required in order to achieve the goals. Adjustments may be required in resource availability, resource requirements, short-term plans, or in the strategic context guiding the agency's efforts. Determining and acting upon the adjustments completes the closed loop AT HRM planning process. The management analysis function also provides human resource requirements information to the budget process.

An automated capability has been developed to tie resource requirements to project implementation and transition activities. This capability, based upon the ARTEMIS planning and scheduling tool, provides management insight into the application of human resources to various phases of the project life-cycle. The AT HRM process summarizes project implementation and transition activities into four major activity groups:

- Project management activities;
- Site preparation activities;
- Test and acceptance activities; and
- Training and procedures development activities.

Human resource skill categories are assigned to each activity in terms of person-days of work required.

This combination of activity groups and required resource skills and quantities provides a basis for analyzing which human resources are being applied in each of the project life-cycle phases. This combination also provides a foundation for monitoring and managing the expenditure of resources on critical planning, coordination, acceptance test, and system shakedown activities that must be successfully accomplished in order to support employment of new systems for ATC OPS.

The tables presented in this chapter are the result of the application of this automated capability. These tables project the en route (and terminal) project requirements for AT human resources for transition activities. In addition, they show that use of AT resources for project planning and site preparation activities occurs as many as 28 months prior to actual equipment delivery.

PROJECT REQUIREMENTS

En Route Facilities

Three major projects will be installed in the 20 ARTCCs in the *Continental United States* (CONUS): PAMRI, VSCS, and ISSS. These projects were described in detail in the 1990 NAS HRM Plan. The implementation schedules used to define the time windows for human resource requirements for transition are based upon the equipment delivery date information contained in the MDFM database as of September 13, 1991. The MDFM dates for the first equipment deliveries to the Seattle ARTCC are: March 29, 1991 (actual delivery has occurred) for PAMRI; September 15, 1993 for VSCS; and February 1, 1994 for ISSS. Table 7-1 presents AT human resource transition requirements for the PAMRI.

Table 7-1. PAMRI Project AT Human Resource Transition Requirements in FTEs

	FY92	FY93	FY94	FY95	FY96	FY97	FY98
Operational Personnel	1	1	0	0	0	0	0
Facility Staff	22	8	1	0	0	0	0
Total Requirements	23	9	1	0	0	0	0

Notes: Requirements in FTEs (compensable hours per year in accordance with OMB Circular A-11). The requirements in this table represent an LOE profile.

Installation of PAMRI equipment in the 20 CONUS ARTCCs began in 1991. Control room (operational) personnel do not have direct contact with this "back room" equipment. AT facility staff are responsible for ensuring coordination of AT OPS with the AF installation team activities.

Table 7-2 presents AT human resource transition requirements for the VSCS.

Table 7-2. VSCS Project AT Human Resource Transition Requirements in FTEs

	FY92	FY93	FY94	FY95	FY96	FY97	FY98
Operational Personnel	2	13	86	81	7	0	0
Facility Staff	13	24	56	84	34	2	0
Total Requirements	15	37	142	165	41	2	0

Notes: Requirements in FTEs (compensable hours per year in accordance with OMB Circular A-11). The requirements in this table represent an LOE profile.

The estimates of operational personnel requirements have been revised to include better definition of the training on the *Voice Communications Equipment Trainer* (VCET) devices and the recurring proficiency training requirements. Facility staff resource requirements reflect the short term need for instructor staff to train the operational personnel (ATCSs, control room supervisors, and traffic management unit personnel) on the VSCS equipment. Additional facility staff resource requirements have been identified to support intra-facility planning, coordination, and test and system shakedown for the VSCS project.

Initial estimates of operational personnel resource requirements for ISSS were derived from a baseline training requirement of 47.5 hours. The training requirement has been increased to 80 hours, and includes both the *Detached Console Trainer* (DCT) and *Dynamic Simulation* (DYSIM) training for operational personnel, ATC supervisors, and traffic management unit personnel.

These LOE requirements reflect current training curriculum and training delivery plans. As these plans change, the LOE requirements will change. Additional requirements for proficiency training for both DCT and DYSIM have been identified. The revised facility staff resource requirements reflect the need for instructor and instructional system support (e.g., remote/pilot operators, etc.) to provide the required training. This instruction will occur prior to the *Initial Operating Capability* (IOC) milestone and the proficiency training will continue until the ORD activity is completed.

Table 7-3 presents AT human resource transition requirements for the ISSS.

Table 7-3. ISSS Project AT Human Resource Transition Requirements in FTEs

	FY92	FY93	FY94	FY95	FY96	FY97	FY98
Operational Personnel	1	3	87	303	245	30	0
Facility Staff	66	69	128	477	450	53	1
Total Requirements	67	72	215	780	695	83	1

Notes: Requirements in FTEs (compensable hours per year in accordance with OMB Circular A-11). The requirements in this table represent an LOE profile.

The data contained in Tables 7-1, 7-2, 7-3, and summarized in Table 7-11, were developed by applying a resource management process developed by the *Air Traffic Office of Resource Management Program* (ATZ-300). The process uses the ARTEMIS planning and scheduling tool supporting the NAS master scheduling system. Briefly, networks of the implementation and transition activities for each project are developed from existing FAA Headquarters and/or regional input. These networks are resource loaded; that is, estimates of the numbers of people, with the necessary skills to do the job, are assigned to each activity in the project network. The master scheduling system tool provides the mechanism for aggregating the projected requirements for people in the various skill categories on a project-by-project basis, for each facility, and at the national level. These raw data are analyzed by management against operational requirements and projections of resource availability, including training program capacity and attrition. The resulting projections of LOE requirements, expressed in terms of FTEs, for ATCSs (operational personnel) and facility staff for the en route facilities have been incorporated into the 1991/92 NAS HRM Plan. This same approach has been applied to develop the estimates for the terminal facilities.

Terminal Facilities

Twelve CIP projects were evaluated for their impact on the ATCTs and TRACON facilities. The implementation periods for these NAS modernization projects are defined by the first equipment delivery date (from the MDFM database) to the last ORD from the Master Schedule Baseline Report. These projects, in chronological order of first system delivery, are:

- *Bright Radar Indicator Tower Equipment* (BRITE)*;
- Terminal Radar (ASR-9)*;
- RVR*;
- *Automated Surface Observation System* (ASOS);
- LLWAS*;
- *Airport Surface Detection Equipment* (ASDE) -3*;
- ARTS-IIA Interface with Mode S/ASR-9*;
- TDWR;
- *Terminal Voice Switch Replacement* (TVSR);
- TAAS;
- TCCC; and
- ACF.

The projects marked with asterisks (*) are currently being installed, and implementation and transition activities are in progress. The LOE requirements for these six projects have been consolidated in Table 7-4. Although small in terms of LOE AT human resource requirements, these projects are no less important to the overall modernization of the terminal ATC facilities. However, as these projects are in advanced stages of the implementation process, project definitions have not been included in the 1991/92 NAS HRM Plan in the interest of brevity.

Table 7-4. Six Consolidated Terminal Project's AT Human Resource Transition Requirements in FTEs

	FY92	FY93	FY94	FY95	FY96	FY97	FY98
Operational Personnel	42	3	0	0	0	0	0
Facility Staff	87	15	1	0	0	0	0
Total Requirements	129	18	1	0	0	0	0

Notes: Requirements in FTEs (compensable hours per year in accordance with OMB Circular A-11). The requirements in this table represent an LOE profile.

Automated Surface Observing System (ASOS)

ASOS Project Implementation

ASOS equipment was first fielded in August 1991. The installation time required at an individual site is expected to be 2 months. The last ORD for ASOS equipment is anticipated to occur in September 1996.

ASOS Impact on AT Staff

Operational Personnel. Introduction of the ASOS weather sensing, compilation, and display systems will require training of ATCSs regarding information displays and data entry and recovery. ATCSs will be required to demonstrate mastery of the ability to call up recurring and special weather information in response to changing weather conditions, to input operationally significant information, to provide current weather information to pilots landing or taking off, or to answer pilot questions. Some specialized training will be required for the ATCSs in the terminal option who are also certified (by the NWS) weather observers.

Facility Staff. Minimal impact is anticipated on facility staff. The staff will participate in the project management and support activities of the implementation and transition phases of the project life-cycle at each facility.

Table 7-5 presents ASOS AT human resource transition requirements.

Table 7-5. ASOS Project AT Human Resource Transition Requirements in FTEs

	FY92	FY93	FY94	FY95	FY96	FY97	FY98
Operational Personnel	7	9	19	12	20	0	0
Facility Staff	4	6	11	7	12	0	0
Total Requirements	11	15	30	19	32	0	0

Notes: Requirements in FTEs (compensable hours per year in accordance with OMB Circular A-11). The requirements in this table represent an LOE profile.

Terminal Doppler Weather Radar (TDWR)

TDWR Project Implementation

The first delivery of TDWR equipment to an operational site is scheduled for June 1992, and the last ORD is projected in February 1995. Installation time per site is expected to be 5 months. A requirement for 45 TDWR sites has been identified.

TDWR Impact on AT Staff

Operational Personnel. TDWR information will be provided to both the ATC facility supervisory position and to the ATCS position replacing the Phase II LLWAS display. At those locations having Phase III LLWAS, the ATCS display will not change. Facility supervisors will receive training to:

- Correctly interpret the warning displays and alarms; and
- Learn how to use the TDWR data on wind shifts, etc., to improve ATC planning.

ATCSs will receive training to:

- Use the TDWR display to relay alerts to pilots at facilities with Phase III LLWAS.

Supervisory training is estimated to be no more than 40 hours in length: ATCS training time requirements are to be determined.

Facility Staff. Facility staff requirements related to TDWR implementation and transition are related to the normal project management and support activities of the project life-cycle. In addition, these requirements are related to the development of facility operating procedures and ATC operating procedures to assure proper integration of TDWR capabilities into the services provided by the facility.

Table 7-6 presents AT transition human resource requirements for TDWR.

Table 7-6. TDWR Project AT Human Resource Transition Requirements in FTEs

	FY92	FY93	FY94	FY95	FY96	FY97	FY98
Operational Personnel	4	16	17	10	0	0	0
Facility Staff	6	7	8	6	0	0	0
Total Requirements	10	23	25	16	0	0	0

Notes: Requirements in FTEs (compensable hours per year in accordance with OMB Circular A-11). The requirements in this table represent an LOE profile.

Terminal Voice Switch Replacement (TVSR)

TVSR Project Implementation

TVSR implementation is expected to begin in September 1992 and to be completed in December 1996. The installation period for this equipment at a single site is estimated to be between 1 and 2 months for the ICSS Phase 1B equipment, and approximately 1 week for the STVS. Approximately 250 new replacement voice switches will be installed.

TVSR Impact on AT Staff

Operational Personnel. The effect of implementation and transition to the TVSR on AT staffing at the terminal facilities should be minimal. Functionality of the systems will remain the same as the existing switching systems; therefore, minimal training for the ATCSs is anticipated.

Facility Staff. Facility staff will be involved in project management and support activities for TVSR implementation and transition. This involvement should not generate significant additional requirements for facility staff resources.

Table 7-7 presents AT transition human resource requirements for TVSR.

Table 7-7. TVSR Project AT Human Resource Transition Requirements in FTEs							
	FY92	FY93	FY94	FY95	FY96	FY97	FY98
Operational Personnel	5	67	96	96	93	76	0
Facility Staff	21	66	84	81	72	50	0
Total Requirements	26	133	180	177	165	126	0
Notes: Requirements in FTEs (compensable hours per year in accordance with OMB Circular A-11). The requirements in this table represent an LOE profile.							

Terminal Advanced Automation System (TAAS)

TAAS Project Implementation

The present scope of the TAAS project is to provide and demonstrate TAAS capability by bringing one TRACON into an ARTCC. TAAS may ultimately be installed in 22 ARTCCs, plus the New York TRACON. The Spokane TRACON and the Seattle ARTCC have been selected for this demonstration. Implementation and transition of the TAAS at an individual site is expected to take 11 months from equipment delivery to ORD. The TAAS project implementation period for the Seattle ARTCC/Spokane TRACON is February 1996 to January 1997. Implementation plans are not complete for this project. For planning purposes, it is assumed that the one TRACON will be moved into an ARTCC to demonstrate the validity and feasibility of the concept.

TAAS Impact on AT Staff

Operational Personnel. AT human resource involvement in TAAS project implementation and transition activity is expected to be significant. ATCSs at the terminal sites will require training on new display and console equipments where TAAS equipment will be installed. ATCSs and facility management will be thoroughly involved in all implementation and transition activities.

Facility Staff. The impact of TAAS implementation and transition on facility staff is expected to be significant. The staff will be directly involved in the full range of project planning and project management support activities. Complete assessment of the impact of TAAS on facility staff is contingent on the results of the consolidation effort involving the Seattle ARTCC and the Spokane TRACON facilities.

Table 7-8 presents AT human resource transition requirements for the TAAS.

Table 7-8. TAAS Project AT Human Resource Transition Requirements in FTEs							
	FY92	FY93	FY94	FY95	FY96	FY97	FY98
Operational Personnel	1	1	3	5	8	*	*
Facility Staff	2	24	49	65	82	*	*
Total Requirements	3	25	52	70	90	*	*
Notes: Requirements in FTEs (compensable hours per year in accordance with OMB Circular A-11). The requirements in this table represent an LOE profile. * Values not estimated pending implementation decision.							

Tower Control Computer Complex (TCCC)

TCCC Project Implementation

TCCC implementation and transition activities at an ATCT will take approximately 1 year. The project implementation period spans the time from February 1996 to February 2001. TCCC equipment will be installed in as many as 258 terminal ATC facilities.

TCCC Impact on AT Staff

Operational Personnel. TCCC implementation in terminal facilities should have a moderate impact on terminal option staffing requirements. All ATCSs at the terminal location will receive training on the operation of the TCCC position console (one per tower cab). The training time per ATCS is not expected to exceed 40 hours.

Facility Staff. Facility staff will be fully involved in project management activities involving implementation and transition of the TCCC project. Training of the operational personnel and facility staff and integration and shakedown testing will require staff resources.

Table 7-9 presents AT human resource transition requirements for the TCCC.

Table 7-9. TCCC Project AT Human Resource Transition Requirements in FTEs							
	FY92	FY93	FY94	FY95	FY96	FY97	FY98
Operational Personnel	3	1	6	17	32	107	217
Facility Staff	3	1	14	41	93	213	355
Total Requirements	6	2	20	58	125	320	572
Notes: Requirements in FTEs (compensable hours per year in accordance with OMB Circular A-11). The requirements in this table represent an LOE profile.							

Area Control Facility (ACF)

ACF Project Implementation

Implementation of the ACF concept is dependent upon completion of many other projects at both en route and terminal facilities. These projects include:

- AAS projects;
- Inter-related communications projects;
- Modernization of the ARTCC physical plants; and
- Installation of upgraded power systems and other projects.

The planned consolidation of terminal and en route ATC services into the ACFs, on a facility-by-facility basis, is expected to occur between 1998 and 2004. Twenty-three ACFs are foreseen.

ACF Impact on AT Staff

Operational Personnel. The advent of the ACF concept will significantly affect terminal option staffing. Studies concerning ACF configurations are underway to validate site requirements, assess risk and vulnerability, optimize consolidation scenarios, and determine the most cost-effective approach to consolidation on a site-by-site basis. In addition, work is underway to assess the human and fiscal impacts of relocating large numbers of employees to distant sites. The precision of estimates as to the effect of consolidation on terminal and en route option staffing is limited to a rough order of magnitude LOE projection. Proximity of facilities is a significant variable. Some TRACONs are located close to the ARTCC into which the terminal ATC services will be consolidated (e.g., the TRACON and the ARTCC serving Indianapolis, Indiana are both located at Weir Cook Airport in Indianapolis). Some TRACONs, however, are located hundreds of miles from the gaining ARTCC (e.g., the Great Falls, Montana approach control facility is approximately 400 air miles from its parent ARTCC at Salt Lake City, Utah). Geographic proximity of the facilities will have an impact on the numbers of operational personnel and the amount of ATCS training that will be required to achieve a seamless transition to the ACF concept.

Facility Staff. Facility staff at the terminal and en route facilities will be significantly affected by the ACF concept. Project planning regarding ATCS training, alignment, and delegation of airspace, procedures development, personnel scheduling, preparation of transition and contingency plans, and definition of integration and shakedown test plans and procedures will be a large transition workload for facility staff personnel. Table 7-10 presents AT human resource transition requirements for the ACF.

Table 7-10. ACF Project AT Human Resource Transition Requirements in FTEs

	FY92	FY93	FY94	FY95	FY96	FY97	FY98
Operational Personnel	0	0	1	1	2	2	13
Facility Staff	0	0	1	3	6	8	28
Total Requirements	0	0	2	4	8	10	41

Notes: Requirements in FTEs (compensable hours per year in accordance with OMB Circular A-11). The requirements in this table represent an LOE profile.

Summary of Human Resource Requirements for Implementation and Transition of CIP Projects

En Route Projects

Our analysis has determined that the LOE requirements to support implementation and transition of the en route projects at the ARTCCs are being driven by the training that the ATCSs must receive and by the instructional staff that is required to provide the training in the most efficient manner. The total LOE requirements for the en route projects is shown in Table 7-11.

Table 7-11. Total for En Route Projects AT Human Resource Transition Requirements in FTEs

	FY92	FY93	FY94	FY95	FY96	FY97	FY98
Operational Personnel							
PAMRI	1	1	0	0	0	0	0
VSCS	2	13	86	81	7	0	0
ISSS	1	3	87	303	245	30	0
Total OPS Pers	4	17	173	384	252	30	0
Facility Staff							
PAMRI	22	8	1	0	0	0	0
VSCS	13	24	56	84	34	2	0
ISSS	66	69	128	477	450	53	1
Total Facility Staff	101	101	185	561	484	55	1
TOTAL REQUIREMENTS	105	118	358	945	736	85	1

Notes: Requirements in FTEs (compensable hours per year in accordance with OMB Circular A-11). The requirements in this table represent an LOE profile.

Terminal Projects

In general, the workload for operational personnel and facility staff at terminal facilities can be contributed to participation in the standard activities of project implementation at an ATC facility:

- Planning support;
- Coordination with the AF installation coordinators;
- ATCS training and certification;
- Acceptance testing, integration testing, system shakedown, procedures development; and
- Dual operation of the existing and replacement systems during the transition period, in some cases.

Not every terminal facility will receive equipment from each of the CIP projects described earlier or in the same sequence. Analysis of project implementation schedules and the resulting impacts on facility staff is continuing.

The total LOE requirements for the terminal projects is shown in Table 7-12.

Table 7-12. Total for Terminal Projects AT Human Resource Transition Requirements in FTEs

	FY92	FY93	FY94	FY95	FY96	FY97	FY98
Operational Personnel	62	97	142	141	155	185	230
Facility Staff	123	119	168	203	265	271	383
Total Requirements	185	216	310	344	420	456	613

Notes: Requirements in FTEs (compensable hours per year in accordance with OMB Circular A-11).

AT Approach for Providing Required Resources for NAS Transition

Plan and Budget for the En Route Facility Human Resource Requirements

Table 7-13 presents the initial staffing approach for en route projects.

Table 7-13. Initial Staffing Approach for En Route Projects

STAFF CATEGORY	REQUIREMENTS IN FTEs	PLAN
	FY92	
Operational Personnel	4	100% absorbed
Facility Staff	101	Contracted or absorbed
	FY93	
Operational Personnel	17	100% absorbed
Facility Staff	101	Contracted or absorbed

Table 7-13. Initial Staffing Approach for En Route Projects		
STAFF CATEGORY	**REQUIREMENTS IN FTEs**	**PLAN**
	FY94	
Operational Personnel	173	10% absorbed 90% FY91 new hires
Facility Staff	185	Contracted or absorbed
	FY95	
Operational Personnel	384	FY91-92 new hires
Facility Staff	561	Contracted and FY91-92 new hires
	FY96	
Operational Personnel	252	FY91-93 new hires
Facility Staff	484	Contracted and FY91-93 new hires
	FY97	
Operational Personnel	30	FY91-94 new hires
Facility Staff	55	Contracted and FY91-94 new hires
	FY98	
Operational Personnel	0	FY91-95 new hires
Facility Staff	1	Contracted and FY91-95 new hires

Notes: Requirements in FTEs (compensable hours per year in accordance with OMB Circular A-11). 20 CONUS sites. PAMRI, VSCS, and ISSS only. Schedules based on planned delivery at Seattle: PAMRI - 3/29/91; VSCS - 9/15/93; ISSS - 2/01/94.

Plan and Budget for the Terminal Facility Human Resource Requirements

Table 7-14 presents the initial staffing approach for terminal projects.

Table 7-14. Initial Staffing Approach for Terminal Projects

STAFF CATEGORY	REQUIREMENTS IN FTEs	PLAN
	FY92	
Operational Personnel	62	90% absorbed 10% overtime
Facility Staff	123	Contracted or absorbed
	FY93	
Operational Personnel	97	90% absorbed 10% overtime
Facility Staff	119	Contracted or absorbed
	FY94	
Operational Personnel	142	90% absorbed 10% overtime
Facility Staff	168	Contracted or absorbed
	FY95	
Operational Personnel	141	90% absorbed 10% overtime
Facility Staff	203	Contracted or absorbed
	FY96	
Operational Personnel	155	90% absorbed 10% overtime
Facility Staff	265	Contracted or absorbed
	FY97	
Operational Personnel	185	90% absorbed 10% overtime
Facility Staff	271	Contracted or absorbed
	FY98	
Operational Personnel	230	90% absorbed 10% overtime
Facility Staff	383	Contracted or absorbed

Notes: Requirements in FTEs (compensable hours per year in accordance with OMB Circular A-11). Multiple sites; not all receiving equipment from all projects. Schedules based on planned delivery dates published in MDFM as of September 13, 1991.

SUMMARY

Additional planning and analysis is underway in AT that will affect the LOE requirements for AT human resources forecasted. Training curriculum development and training delivery scenarios are being reviewed to determine the most effective training programs. A series of software models have been created to help identify the impact of NAS implementation on operational personnel (time required away from the control room to learn how to employ new equipment) and on facility staff (the size of the training team) requirements. Efforts have been made to quantify and project AT's capacity to produce full performance level ATCSs through the en route facility training programs. Advances in planning techniques provide better resource availability and resource requirement information, which will be applied to the AT HRM planning process to further refine the LOE resource requirement estimates.

Last year, AT's planning process involved the en route facilities. This year, the process was expanded to include the terminal projects.

CHAPTER 8: SUMMARY AND FUTURE DIRECTIONS FOR THE NAS HRM PROGRAM

INTRODUCTION

The HRM requirements and strategies presented in Chapters 4 through 7 contain a number of common trends or themes which suggest several important conclusions regarding the current status of human resource planning in the FAA. This final chapter of 1991/92 NAS HRM Plan presents a summary as well as future directions for the NAS HRM Program.

SUMMARY

A review of the line and support organization chapters suggests five major points about the current state of human resource planning for NAS modernization:

- Each line and support organization has significantly improved its human resource planning process;
- Each organization will experience a large demand on human resources required to support CIP projects in FY94-96;
- The size of the demand and lack of estimated future availability makes it difficult to develop strategies to meet the demand;
- Each organization recognizes that it can improve its human resource planning process; and
- Future editions of the NAS HRM Plan should be expanded to provide a total picture of the FAA requirements to support NAS modernization.

The paragraphs below discuss each of these points further.

First, the expanded scope of human resource requirements and availability information provided by each line and support organization shows their significant progress in the development of human resource planning processes. However, the total demand for FAA human resources to support NAS modernization during FY94-96 is likely to be larger than the estimates provided because other organizations, such as AXD, will experience requirements not reflected in the 1991/92 NAS HRM Plan. Future volumes of the NAS HRM Plan will capture more of these requirements as the data become available from each organization.

Second, each of the organizations included in the 1991/92 NAS HRM Plan will experience a large demand on human resources required to support CIP projects during the FY94-96 time frame. While the lack of a consistent unit of measurement prevents the development of a comprehensive picture of human resource requirements, a general pattern emerges for each organization:

- The FAA Technical Center experiences its peak requirements in FY94. This reflects the mission of this organization to test and accept delivery of new systems prior to delivery of the systems at the AF and AT facility level organizations; and

- The peak requirements for Aeronautical Center, AF, and AT occur in the FY95-96 time frame and beyond. It is during this period that the Aeronautical Center will prepare and provide logistical support and transition training for many of the new systems, and the operational and maintenance personnel in AF and AT will receive transition training and assist with the implementation of many of the CIP projects included in the 1991/92 NAS HRM Plan.

Third, the size of the human resource demand and lack of estimated availability of human resources in the future make it difficult to develop strategies to meet the demand. The strategies presented in the organizations' chapters are general approaches to meeting requirements and may not completely satisfy all requirements. These strategies include using a mixture of existing FAA personnel, new personnel, contractor resources, and management actions to meet requirements. Each organization tailored particular strategies to the nature of the human resource requirements, estimates of future availability, and resource options unique to that organization. Specific details of the implementation of these strategies are still under development. As each organization further develops its strategy, it will calculate the costs of implementing the human resource strategy and take appropriate actions to ensure that budget requests support its implementation.

Fourth, each organization participating in the NAS HRM planning process recognizes it can improve its planning process. Each organization has identified the general areas, and in some cases, specific steps or projects, on which they will work to improve their planning processes over the next several years. Improving the quality of the data used to estimate human resource requirements and availability is noted by several of the participating organizations. Improvements also include the development of better analytic models to make projections and evaluate the feasibility of human resource strategies.

Finally, while the 1991/92 NAS HRM Plan presents a more comprehensive assessment of human resource requirements than the 1990 NAS HRM Plan, expanding the NAS HRM Plan further would provide a total picture of the FAA requirements to support NAS modernization. Future analyses should be conducted in similar units of measure and provide a complete estimate of requirements over a broader planning time frame. In addition, the analyses should be expanded to include other organizations and to explore the demands of other NAS modernization projects competing with human resources required to support CIP modernization. The human resources required to support the operation and maintenance of the existing systems, as well as to support the modernization effort, should be included in the NAS HRM Plan. The AF chapter in the 1991/92 NAS HRM Plan already includes a comprehensive treatment of requirements. Such a comprehensive view is necessary to assess the adequacy of strategies implemented to meet the NAS modernization requirements and would more adequately reflect the operational reality faced by each organization.

FUTURE DIRECTIONS FOR THE NAS HRM PROGRAM

One of the objectives of the NAS HRM Program is to institutionalize an ongoing human resource planning process for NAS modernization efforts. This section of the 1991/92 NAS HRM Plan provides an overview of the current and future activities.

Refinement and Enhancement of Line and Support Organization HRM Planning Process

AHD-300 will continue to support FAA organizations in the enhancement and refinement of their HRM planning processes. As demonstrated over the last 18 months, the line and support organizations have assumed primary responsibility for this task. The organizations included in the 1991/92 NAS HRM Plan have developed action plans committing to specific steps to enhance and refine their respective planning processes. These actions include improving workload data, refining training requirements data, developing KSA data, developing or refining methodologies to examine facility consolidation, and developing site-level analysis tools.

Extension to New Work Forces

The NAS HRM planning process is currently being expanded to include additional FAA work forces impacted by the NAS modernization effort. AHD-300 will assist the FS, Aviation Security, and Aircraft Certification organizations in assessing their respective requirements for NAS HRM planning support. These organizations will be included in the future iterations of the NAS HRM Plan.

Development and Refinement of HRM Planning Models

In conjunction with the refinement of line and support organization HRM planning processes and inclusion of new work forces in the NAS HRM planning process, AHD-300 will support the development and refinement of HRM planning models. The refinement of the planning models by AHD will be focused on the more generic functions which can be easily adapted to new work forces incorporated in future iterations of the NAS HRM Plan. Tailoring or refinement of models to meet unique work force requirements will be supported primarily by each individual work force.

In addition to refining existing HRM planning models, work will continue to develop a flexible automated human resource strategy development and costing model, site-level analysis tools, and an HRM life-cycle cost model. Model development is expected to continue through FY94.

Development of a NAS HRM Communication Strategy

The report on the assessment of internal FAA communications initiatives completed under CIP Project 56-22 outlines a number of actions which will enhance the communication of information supporting NAS modernization. The FAA recognizes that issues will continue to exist with internal and external communications activities. The agency's Executive Steering Group for Total Quality Management recently tasked the AXO-1 with chairing a *Quality Management Board* (QMB) for Communications. The NAS HRM Program will participate as a member of the QMB and will continue to raise issues with respect to NAS modernization in that forum.

Refinement and Extension of HRM Analytic Approaches and Data

Through FY91, the NAS HRM Program examined HRM impacts of NAS modernization and focused primarily on transition and operational workload, training, and availability issues. The analytic approaches and data used to address these issues require continued refinement. AHD-300 and the individual line and support organizations have supported efforts to improve data quality and refine analytic methods. In the immediate future, these efforts will focus on improved workload, training, KSA, and demographic data.

In the FY93-94 time frame, the emphasis will shift to expand data and analytic methods to cover issues related to facility consolidation; measures of productivity; and analysis of recruitment, retention, and compensation issues.

Development of a Human Resource Planning Order

An FAA Human Resource Planning Order and human resource planning data standards will be developed as part of the NAS HRM Program in the FY92-93 time frame. The later phases of the NAS HRM road map project, initiated in FY91, will focus on the development of an FAA order supporting human resource planning efforts, particularly in the context of NAS modernization. The order will outline the FAA human resource planning process, identify organizational responsibilities, define linkages to other FAA planning efforts, and begin to establish human resource planning data standards.

Integration of NAS HRM Planning with Other FAA Planning Efforts

The institutionalization of the NAS HRM planning process is in large part dependent upon the integration of the HRM planning process with other major FAA planning efforts. The continued development of direct linkages between the HRM planning process and the annual FAA budget planning process is a primary focus of this integration effort in the immediate future.

A second area of focus in the immediate future is increased coordination of NAS human resource planning in the line and support organizations with human resource planning activities in the system acquisition community. Efforts in this area will continue to include a coordinated program with the *Automation Division* (ASE-100) to identify requirements and implement programs to improve AT workload models and data and coordination between the NAS HRM Program and the NAILS Program.

As a third area of focus, the NAS HRM Program will continue to coordinate and assist with the definition of an FAA-wide human factors process in conjunction with the HFCC. The addition of a full-time human factors psychologist to AHD-300 staff is a major step in facilitating the integration of the NAS HRM Program with the FAA human factors process. The NAS HRM team will work with other elements of AHR to develop an internal process for managing and applying human factors research to the problems of human resource planning and training and development. A large part of this task will be developing structured relationships and processes with other FAA organizations which will allow information and data to flow systematically and routinely between appropriate organizations.

As a fourth area of focus, the NAS HRM Program continues to coordinate with the *NAS Transition and Implementation Service* (ANS) to ensure congruity between national and site specific policies and plans. This includes, for instance, special projects and site implementation plans.

SUMMARY

The 1991/92 NAS HRM Plan documents progress toward an ongoing, integrated, long-range human resource planning process. The scope of the planning process will be expanded in future years to include other issues relevant to HRM, other work forces, and greater integration across ongoing FAA HRM planning programs which support the NAS modernization effort. The information included in the plan will be updated as new information and assumptions become available. The analytic tools which support the analyses underlying the NAS HRM Plan will also be refined and enhanced.

APPENDIX A

CIP PROJECTS ADDRESSED IN 1991/92 NAS HRM PLAN

Table A-1. CIP Systems/Projects with HR Impacts* in the 1991/92 NAS HRM Plan

CIP PROJECT OR SYSTEM	ORGANIZATIONAL IMPACT					
				AAC		
	AT	AF	ACT	ACADEMY	LOGISTICS CENTER	AMS BRANCH
21-02 Flight Data Entry and Printout Devices	No	F&E - Yes OPS - Yes	No	No	No	No
21-04 EARTS Enhancements	No	F&E - Yes OPS - Yes	No	No	No	No
21-05 Oceanic Display and Planning System (ODAPS)	No	F&E - Yes OPS - Yes	Yes	No	No	No
21-06 Traffic Management System (TMS)	No	F&E - Yes OPS - Yes	Yes	No	No	No
21-11 Voice Switching and Control System (VSCS)	Yes	F&E - Yes OPS - Yes	Yes	Yes	Yes	No
21-12 Area Control Computer Complex (ACCC)	No	F&E - Yes OPS - Yes	Yes	Yes	Yes	Yes
21-12 Initial Sector Suite System (ISSS)	Yes	F&E - Yes OPS - Yes	Yes	Yes	Yes	No
21-12 Peripheral Adaptor Module Replacement Item (PAMRI)	Yes	F&E - Yes OPS - Yes	Yes	No	No	No
21-12 Terminal Advanced Automation System (TAAS)	Yes	F&E - Yes OPS - Yes	Yes	Yes	Yes	Yes
21-12 Tower Control Computer Complex (TCCC)	Yes	F&E - Yes OPS - Yes	Yes	Yes	No	No
21-13 Automated En Route Air Traffic Control (AERA)	No	F&E - No OPS - No	Yes	No	No	No

* Each organization examined all CIP systems; those systems marked "Yes" are those systems with impacts in the relevant time frame. Future iterations of the NAS HRM Plan will address systems with impacts in future years.

Table A-1. CIP Systems/Projects with HR Impacts* in the 1991/92 NAS HRM Plan

CIP PROJECT OR SYSTEM	ORGANIZATIONAL IMPACT					
				AAC		
	AT	AF	ACT	ACADEMY	LOGISTICS CENTER	AMS BRANCH
21-15 Area Control Facilities (ACF)	Yes	F&E - No OPS - Yes	No	No	No	No
21-16 Offshore Flight Data Processing System (OFDPS)	No	F&E - Yes OPS - Yes	No	No	No	No
22-06 ARTS IIA Enhancements	No	F&E - Yes OPS - Yes	Yes	No	No	No
22-09 ARTS IIA Interface with Mode S/ASR 9	Yes	F&E - Yes OPS - Yes	Yes	No	No	No
22-11 High Capacity Voice Recorder (HCVR)	No	F&E - No OPS - Yes	Yes	No	No	No
22-11 Multichannel Voice Recorders	No	F&E - No OPS - No	Yes	No	No	No
22-12 Terminal Voice Switch Replacement (TVSR). Also formerly known as Tower Communications System (TCS)	Yes	F&E - Yes OPS - Yes	Yes	No	Yes	No
22-13 ACTC/TRACON Establishment, Replacement and Modernization	No	F&E - Yes OPS - Yes	No	No	No	No
22-16 Bright Radar Indicator Tower Equipment (BRITE)	Yes	F&E - Yes OPS - Yes	No	No	No	No
23-01 Flight Service Automation System (FSAS)	No	F&E - Yes OPS - Yes	No	Yes	No	No

* Each organization examined all CIP systems; those systems marked "Yes" are those systems with impacts in the relevant time frame. Future iterations of the NAS HRM Plan will address systems with impacts in future years.

Table A-1. CIP Systems/Projects with HR Impacts* in the 1991/92 NAS HRM Plan

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23-02 Central Weather Processor (CWP)/Real Time Weather Processor (RWP)	No	F&E - Yes OPS - Yes	Yes	No	Yes	Yes
23-04 Weather Message Switching Center (WMSC) Replacement	No	F&E - Yes OPS - Yes	Yes	No	No	No
23-05 Aeronautical Data Link	No	F&E - No OPS - No	Yes	No	No	No
23-05 Data Link Processor (DLP/WCP)	No	F&E - No OPS - Yes	Yes	No	No	No
23-09 Automated Surface Observation System (ASOS)	Yes	F&E - Yes OPS - Yes	Yes	No	No	No
23-09 Automated Weather Observation System (AWOS)	No	F&E - Yes OPS - Yes	Yes	No	No	No
23-12 Low Level Wind Shear Alert System (LLWAS)	Yes	F&E - Yes OPS - Yes	No	No	No	Yes
23-13 Integrated Communications Switching System (ICSS)	No	F&E - Yes OPS - Yes	Yes	No	Yes	No
24-02 Communications Facilities Consolidation - Network	No	F&E - Yes OPS - Yes	No	No	Yes	No
24-03 VORTAC	No	F&E - No OPS - No	Yes	No	No	No

* Each organization examined all CIP systems; those systems marked "Yes" are those systems with impacts in the relevant time frame. Future iterations of the NAS HRM Plan will address systems with impacts in future years.

Table A-1. CIP Systems/Projects with HR Impacts* in the 1991/92 NAS HRM Plan

CIP PROJECT OR SYSTEM	ORGANIZATIONAL IMPACT					
				AAC		
	AT	AF	ACT	ACADEMY	LOGISTICS CENTER	AMS BRANCH
24-07 Microwave Landing System (MLS)	No	F&E - Yes OPS - Yes	Yes	No	Yes	Yes
24-08 Runway Visual Range (RVR)	Yes	F&E - Yes OPS - Yes	No	No	No	No
24-09 Visual Approach Slope Indicator (VASI)	No	F&E - Yes OPS - Yes	No	No	No	No
24-09 Visual Navaids	No	F&E - Yes OPS - Yes	No	No	No	No
24-10 Approach Lighting System Improvement Program (ALSIP)	No	F&E - Yes OPS - Yes	No	No	No	No
24-11 Direction Finder (DF)	No	F&E - Yes OPS - Yes	Yes	No	No	No
24-12 Mode S	No	F&E - Yes OPS - Yes	Yes	No	Yes	No
24-13 Terminal Radar (ASR) Program	Yes	F&E - Yes OPS - Yes	No	No	No	No
24-14 Airport Surface Detection Equipment (ASDE-3)	Yes	F&E - Yes OPS - Yes	No	No	No	No
24-15 Air Route Surveillance Radar (ARSR) - 4	No	F&E - Yes OPS - Yes	Yes	No	No	No
24-15 Long Range Radar Program	No	F&E - Yes OPS - Yes	Yes	No	Yes	No
24-16 Weather Radar Program	No	F&E - Yes OPS - Yes	Yes	No	No	No
24-17 LORAN-C Systems	No	F&E - Yes OPS - Yes	No	No	No	No

* Each organization examined all CIP systems; those systems marked "Yes" are those systems with impacts in the relevant time frame. Future iterations of the NAS HRM Plan will address systems with impacts in future years.

Table A-1. CIP Systems/Projects with HR Impacts* in the 1991/92 NAS HRM Plan

CIP PROJECT OR SYSTEM	ORGANIZATIONAL IMPACT					
				AAC		
	AT	AF	ACT	ACADEMY	LOGISTICS CENTER	AMS BRANCH
24-18 Terminal Doppler Weather Radar (TDWR)	Yes	F&E - Yes OPS - Yes	Yes	No	Yes	No
25-02 Data Multiplexing Network (DMN)	No	F&E - Yes OPS - Yes	Yes	No	No	No
25-07 National Airspace Data Interchange Network (NADIN 2)	No	F&E - Yes OPS - Yes	Yes	No	Yes	No
25-08 Radio Control Equipment (RCE)	No	F&E - Yes OPS - Yes	Yes	No	No	No
26-01 Remote Maintenance Monitoring System (RMMS) - Maintenance Processor Subsystem	No	F&E - Yes OPS - Yes	Yes	No	No	Yes
26-02 Computer Based Instruction (CBI)	No	F&E - Yes OPS - Yes	No	No	No	No
26-04 Maintenance Control Centers (MCC)	No	F&E - Yes OPS - Yes	No	No	No	No
26-07 Uninterruptible Power System (UPS/PCS)	No	F&E - Yes OPS - Yes	No	No	No	No
26-07 Power Systems	No	F&E - Yes OPS - Yes	No	No	Yes	No
26-14 National Radio Communications System (NARACS)	No	F&E - Yes OPS - Yes	No	No	No	No

* Each organization examined all CIP systems; those systems marked "Yes" are those systems with impacts in the relevant time frame. Future iterations of the NAS HRM Plan will address systems with impacts in future years.

Table A-1. CIP Systems/Projects with HR Impacts* in the 1991/92 NAS HRM Plan

CIP PROJECT OR SYSTEM	ORGANIZATIONAL IMPACT					
				AAC		
	AT	AF	ACT	ACADEMY	LOGISTICS CENTER	AMS BRANCH
32-06 Automated Radar Terminal System (ARTS)	No	F&E - Yes OPS - Yes	Yes	No	No	No
32-06 Expand ARTS IIA Capacity and Provide Mode C Intruder (MCI) Capability	No	F&E - Yes OPS - Yes	Yes	No	No	No
32-13 Airport Traffic Control Tower (ATCT) Establishment	No	F&E - Yes OPS - Yes	No	No	No	No
32-20 Expand Automated Radar Terminal System (ARTS) IIIA Capacity and Provide Mode C Intruder (MCI) Capability	No	F&E - No OPS - Yes	Yes	No	No	No
32-22 Dallas/Fort Worth Metroplex	No	F&E - No OPS - No	Yes	No	No	No
32-24 Establish New Chicago Terminal Radar Approach Control (TRACON) Facility	No	F&E - No OPS - Yes	Yes	No	No	No
32-26 Southern California Terminal Airspace Realignment (STAR)/Southern California TRACON (SCT)	No	F&E - Yes OPS - Yes	Yes	No	No	No
32-31 Base Buildings for Airport Traffic Control Towers (ATCT)	No	F&E - Yes OPS - Yes	No	No	No	No

* Each organization examined all CIP systems; those systems marked "Yes" are those systems with impacts in the relevant time frame. Future iterations of the NAS HRM Plan will address systems with impacts in future years.

Table A-1. CIP Systems/Projects with HR Impacts* in the 1991/92 NAS HRM Plan

CIP PROJECT OR SYSTEM	ORGANIZATIONAL IMPACT					
				AAC		
	AT	AF	ACT	ACADEMY	LOGISTICS CENTER	AMS BRANCH
33-01 Direct User Access Terminal (DUAT)	No	F&E - No OPS - Yes	Yes	No	No	No
34-04 Establish Locator Outer Markers (LOM)	No	F&E - Yes OPS - Yes	No	No	No	No
34-06 Instrument Landing System (ILS) (GS, LOC, Marker)	No	F&E - Yes OPS - Yes	No	No	Yes	Yes
34-07 Microwave Landing System (MLS) Phase II	No	F&E - Yes OPS - Yes	No	No	No	Yes
34-08 Runway Visual Range (RVR) Establishment	No	F&E - No OPS - Yes	No	No	No	No
34-12 Air Traffic Control Beacon Interrogator (ATCBI) Establishment	No	F&E - No OPS - Yes	No	No	No	No
34-13 Terminal Radar Digitizing, Replacement and Establishment	No	F&E - Yes OPS - Yes	No	No	Yes	No
34-14 Additional Airport Surface Detection Equipment (ASDE) Establishment	No	F&E - No OPS - Yes	No	No	No	No
34-23 Communications Facilities Expansion	No	F&E - Yes OPS - Yes	No	No	No	No

* Each organization examined all CIP systems; those systems marked "Yes" are those systems with impacts in the relevant time frame. Future iterations of the NAS HRM Plan will address systems with impacts in future years.

Table A-1. CIP Systems/Projects with HR Impacts* in the 1991/92 NAS HRM Plan

CIP PROJECT OR SYSTEM	ORGANIZATIONAL IMPACT					
				AAC		
	AT	AF	ACT	ACADEMY	LOGISTICS CENTER	AMS BRANCH
35-07 National Airspace Data Interchange Network (NADIN) II Continuation	No	F&E - No OPS - Yes	No	No	No	No
41-21 En Route Software Development Support	No	F&E - No OPS - No	Yes	No	No	No
42-13 Airport Traffic Control Tower (ATCT)/Terminal Radar Approach Control (TRACON) Modernization	No	F&E - Yes OPS - Yes	Yes	No	No	No
42-14 Airport Traffic Control Tower (ATCT)/Terminal Radar Approach Control (TRACON) Replacement	No	F&E - Yes OPS - Yes	No	No	No	No
42-20 Airport Traffic Control Tower (ATCT) System Intra-Connectivity	No	F&E - No OPS - Yes	Yes	No	No	No
42-21 Terminal Software Development	No	F&E - No OPS - No	Yes	No	No	No
43-01 Replace Regional Interim Weather Graphics with National Graphic Weather Display System (GWDS)	No	F&E - Yes OPS - Yes	No	No	No	No

* Each organization examined all CIP systems; those systems marked "Yes" are those systems with impacts in the relevant time frame. Future iterations of the NAS HRM Plan will address systems with impacts in future years.

Table A-1. CIP Systems/Projects with HR Impacts* in the 1991/92 NAS HRM Plan

CIP PROJECT OR SYSTEM	ORGANIZATIONAL IMPACT					
				AAC		
	AT	AF	ACT	ACADEMY	LOGISTICS CENTER	AMS BRANCH
43-03 Provide Flight Service Automation Service (FSAS) Power Conditioning Systems	No	F&E - Yes OPS - Yes	No	No	No	Yes
43-04 Flight Service Automation System (FSAS) Computer Replacement	No	F&E - No OPS - Yes	No	No	No	No
43-04 Flight Service Automation System (FSAS) Computer Replacement	No	F&E - No OPS - Yes	No	No	No	No
43-09 Upgrade Commercial Automated Weather Observing System (AWOS)	No	F&E - No OPS - Yes	No	No	No	No
43-12 Upgrade Low Level Wind Shear Alert System (LLWAS) to Expanded Network Configuration	Yes	F&E - Yes OPS - Yes	No	No	No	No
43-14 Integrated Communications Switching System (ICSS) Logistics Support	No	F&E - Yes OPS - Yes	No	No	No	No
43-20 Automated Flight Service Station (AFSS) Support	No	F&E - No OPS - Yes	No	No	No	No
44-05 Interim Backup Emergency Communications (BUEC) Improvement	No	F&E - No OPS - Yes	No	No	No	No

* Each organization examined all CIP systems; those systems marked "Yes" are those systems with impacts in the relevant time frame. Future iterations of the NAS HRM Plan will address systems with impacts in future years.

Table A-1. CIP Systems/Projects with HR Impacts* in the 1991/92 NAS HRM Plan

CIP PROJECT OR SYSTEM	ORGANIZATIONAL IMPACT					
				AAC		
	AT	AF	ACT	ACADEMY	LOGISTICS CENTER	AMS BRANCH
44-07 Emergency Tranceiver Replacement	No	F&E - No OPS - Yes	Yes	No	No	No
44-29 Runway Visual Range (RVR) Replacement	No	F&E - Yes OPS - Yes	No	No	Yes	No
44-30 Sustain Distance Measuring Equipment (DME)	No	F&E - Yes OPS - Yes	No	No	No	No
44-31 Replace Type FA9964 Direction Finder (DF)	No	F&E - Yes OPS - Yes	No	No	No	No
44-32 Sustain Nondirectional Beacon (NDB)	No	F&E - No OPS - Yes	No	No	No	Yes
44-35 LORAN - C Monitors	No	F&E - Yes OPS - Yes	Yes	No	No	No
44-39 Relocate Air Route Surveillance Radar (ARSR)	No	F&E - Yes OPS - Yes	No	No	No	No
44-40 Long Range Radar Improvements	No	F&E - Yes OPS - Yes	No	No	No	No
44-45 Air Traffic Control Radar Beacon System (ATCRBS) Relocation	No	F&E - Yes OPS - Yes	No	No	No	No
44-46 Air Traffic Control Beacon Interrogator (ATCBI) Replacement	No	F&E - Yes OPS - Yes	No	No	Yes	No
44-60 Sustain or Relocate Airport Surveillance Radar (ASR)	No	F&E - Yes OPS - Yes	No	No	No	No

* Each organization examined all CIP systems; those systems marked "Yes" are those systems with impacts in the relevant time frame. Future iterations of the NAS HRM Plan will address systems with impacts in future years.

Table A-1. CIP Systems/Projects with HR Impacts* in the 1991/92 NAS HRM Plan

CIP PROJECT OR SYSTEM	ORGANIZATIONAL IMPACT					
				AAC		
	AT	AF	ACT	ACADEMY	LOGISTICS CENTER	AMS BRANCH
45-02 Data Multiplexing Network (DMN) Continuation	No	F&E - No OPS - Yes	No	No	No	No
45-05 Expansion or Reconfiguration of Routing and Circuit Restoral (RCR)	No	F&E - No OPS - Yes	Yes	No	No	No
45-06 Expansion or Reconfiguration of Routing and Circuit Restoral (RCR) - Low Density Radio Communications Link (RCL)	No	F&E - No OPS - Yes	Yes	No	No	No
46-01 Sustain Remote Maintenance Monitoring System	No	F&E - No OPS - Yes	No	No	No	No
46-04 Maintenance Center Control (MCC) Enhancement	No	F&E - No OPS - Yes	No	No	No	No
46-07 Power Systems Sustained Effort	No	F&E - Yes OPS - Yes	Yes	No	No	No
46-26 Airport Traffic Control Tower (ATCT) Safety Upgrades	No	F&E - No OPS - Yes	No	No	No	No
46-30 Interim Support Plan (ISP)	No	F&E - No OPS - Yes	No	No	Yes	No
52-21 ARTS IIIA Peripheral Adapter Module (PAM) Modernization	No	F&E - Yes OPS - Yes	No	No	No	No

* Each organization examined all CIP systems; those systems marked "Yes" are those systems with impacts in the relevant time frame. Future iterations of the NAS HRM Plan will address systems with impacts in future years.

Table A-1. CIP Systems/Projects with HR Impacts* in the 1991/92 NAS HRM Plan

CIP PROJECT OR SYSTEM	ORGANIZATIONAL IMPACT					
				AAC		
	AT	AF	ACT	ACADEMY	LOGISTICS CENTER	AMS BRANCH
56-02 Computer Based Instruction (CBI) Expansion	No	F&E - No OPS - Yes	No	No	No	No
56-15 NAS Spectrum Engineering Sustained Support	No	F&E - No OPS - No	Yes	No	No	No
56-17 System Support Laboratory Sustained Support - En Route System Support/Terminal System Support	No	F&E - No OPS - No	Yes	No	No	No
56-18 General Support Laboratory Sustained Support - General Purpose Data Center/NAS Simulation Support	No	F&E - No OPS - No	Yes	No	No	No
56-19 FAA Technical Center Building and Plan Support	No	F&E - No OPS - No	Yes	No	No	No
56-22 Human Resource Management	No	F&E - No OPS - No	Yes	No	No	No
56-27 Test Equipment Replacement	No	F&E - No OPS - No	Yes	No	No	No
56-56 NAS Management Automation Program (NASMAP)	No	F&E - No OPS - No	Yes	No	No	No
62-20 Terminal ATC Automation (TATCA)	No	F&E - No OPS - No	Yes	No	No	No

* Each organization examined all CIP systems; those systems marked "Yes" are those systems with impacts in the relevant time frame. Future iterations of the NAS HRM Plan will address systems with impacts in future years.

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CIP PROJECT OR SYSTEM	ORGANIZATIONAL IMPACT					
				AAC		
	AT	AF	ACT	ACADEMY	LOGISTICS CENTER	AMS BRANCH
62-23 Airport Movement Area Safety System (AMASS)	No	F&E - No OPS - Yes	No	No	Yes	No
63-02 Central Weather Processor (CWP) Interfaces	No	F&E - No OPS - Yes	No	No	No	No
63-05 Aeronautical Data Link Communications and Applications - Data Link Processor (DLP/WCP) Enhancements	No	F&E - No OPS - Yes	Yes	No	Yes	No
63-12 Low Level Wind Shear Alert System (LLWAS) Enhancements	No	F&E - No OPS - Yes	No	No	Yes	No
64-05 Global Positioning System (GPS) Monitors	No	F&E - Yes OPS - Yes	No	No	No	Yes
64-13 Airport Surveillance Radar (ASR - 9) Modification for Low Altitude Wind Shear Detection	No	F&E - Yes OPS - Yes	No	No	No	No
64-16 Weather Enhancements	No	F&E - Yes OPS - Yes	No	No	No	No
64-29 Automatic Dependent Surveillance (ADS) Ground	No	F&E - No OPS - No	Yes	No	No	No
XX-XX Air Route Surveillance Radar (ARSR - 5)	No	F&E - Yes OPS - No	No	No	No	No

* Each organization examined all CIP systems; those systems marked "Yes" are those systems with impacts in the relevant time frame. Future iterations of the NAS HRM Plan will address systems with impacts in future years.

Table A-1. CIP Systems/Projects with HR Impacts* in the 1991/92 NAS HRM Plan

CIP PROJECT OR SYSTEM	ORGANIZATIONAL IMPACT					
				AAC		
	AT	AF	ACT	ACADEMY	LOGISTICS CENTER	AMS BRANCH
XX-XX Air Route Surveillance Radar SST	No	F&E - No OPS - No	No	No	No	Yes
XX-XX Air-Ground Linear Power Amplifier (A/G LPA)	No	F&E - No OPS - Yes	No	No	Yes	No
XX-XX Automatic Tracking System	No	F&E - No OPS - No	Yes	No	No	No
XX-XX Engineering Support	No	F&E - No OPS - No	Yes	No	No	No
XX-XX Field Support	No	F&E - No OPS - Yes	Yes	No	No	No
XX-XX Maintenance Automation (Associated with projects 26-01, 26-04, and 46-04)	No	F&E - No OPS - Yes	Yes	No	No	No
XX-XX NAS Transition Support	No	F&E - No OPS - No	Yes	No	No	No
XX-XX Nav. Support	No	F&E - No OPS - No	Yes	No	No	No
XX-XX Navigational Aids Support	No	F&E - No OPS - No	Yes	No	No	No
XX-XX Precision Runway Monitor	No	F&E - Yes OPS - Yes	Yes	No	No	No
XX-XX Propane and Natural Gas Engines	No	F&E - No OPS - Yes	No	No	No	Yes
XX-XX Radar Training Facility Expansion	No	F&E - No OPS - No	No	No	No	Yes

* Each organization examined all CIP systems; those systems marked "Yes" are those systems with impacts in the relevant time frame. Future iterations of the NAS HRM Plan will address systems with impacts in future years.

Table A-1. CIP Systems/Projects with HR Impacts* in the 1991/92 NAS HRM Plan

CIP PROJECT OR SYSTEM	ORGANIZATIONAL IMPACT					
				AAC		
	AT	AF	ACT	ACADEMY	LOGISTICS CENTER	AMS BRANCH
XX-XX Remote Control Interface Unit (Associated with projects 26-01, 26-04, and 46-04)	No	F&E - No OPS - Yes	No	No	No	Yes
XX-XX Scan Radars Support	No	F&E - No OPS - No	Yes	No	No	No
XX-XX Secondary Surveillance Radar (Associated with projects 24-12, 34-12, 44-45, and 44-46)	No	F&E - No OPS - Yes	Yes	No	No	Yes
XX-XX System Design Support	No	F&E - No OPS - No	Yes	No	No	No
XX-XX Terminal B/W Development Support	No	F&E - No OPS - No	Yes	No	No	No
XX-XX Tower Simulator	No	F&E - No OPS - No	No	No	No	Yes
XX-XX Transceiver Replacement	No	F&E - No OPS - Yes	Yes	No	No	No
XX-XX Transmitter and Receiver Replacement	No	F&E - No OPS - Yes	Yes	No	No	No

* Each organization examined all CIP systems; those systems marked "Yes" are those systems with impacts in the relevant time frame. Future iterations of the NAS HRM Plan will address systems with impacts in future years.

APPENDIX B

SUPPORTING INFORMATION FOR RESULTS OF ANALYSES

Table B-1. AF Staffing Estimates Regional F&E Workload Analysis by Region						
		FY92	**FY93**	**FY94**	**FY95**	**FY96**
AAL	Requirements	66.2	162.8	235.3	167.8	173.5
	Indirect Requirements	43.9	46.1	46.1	45.7	46.4
	Carry-Over from Prior Year	0.0	16.8	118.7	270.9	367.4
	Total Requirements	110.1	225.6	400.1	484.4	587.3
	Available F&E Staffing	80.0	85.0	85.0	85.0	85.0
	Available TSSC	13.3	20.8	44.1	32.0	22.1
	Available Other Contracts	0.0	1.1	0.0	0.0	0.1
	Total Available	93.3	106.9	129.1	117.0	107.2
	(Short Fall) Surplus	(16.8)	(118.7)	(270.9)	(367.4)	(480.1)
ACE	Requirements	184.6	189.3	221.7	123.0	59.9
	Indirect Requirements	32.1	35.5	43.4	43.2	43.6
	Carry-Over from Prior Year	0.0	59.6	131.0	260.1	304.3
	Total Requirements	216.7	284.4	396.0	426.2	407.8
	Available F&E Staffing	97.0	105.0	105.0	105.0	105.0
	Available TSSC	46.8	33.9	24.7	15.9	10.8
	Available Other Contracts	13.3	14.6	6.2	1.0	0.0
	Total Available	157.1	153.5	135.9	121.9	115.8
	(Short Fall) Surplus	(59.6)	(131.0)	(260.1)	(304.3)	(292.0)
AEA	Requirements	368.6	382.2	290.5	231.1	146.9
	Indirect Requirements	54.8	65.2	68.7	69.9	70.7
	Carry-Over from Prior Year	0.0	145.1	295.7	352.1	370.1
	Total Requirements	423.4	592.5	654.9	653.2	587.7
	Available F&E Staffing	172.5	186.0	186.0	186.0	186.0
	Available TSSC	80.1	83.2	94.0	77.4	56.2
	Available Other Contracts	25.7	27.6	22.8	19.7	13.0
	Total Available	278.4	296.8	302.8	283.1	255.2
	(Short Fall) Surplus	(145.1)	(295.7)	(352.1)	(370.1)	(332.5)
AGL	Requirements	204.0	254.7	237.3	233.0	188.9
	Indirect Requirements	19.1	34.2	41.4	41.4	41.3

Table B-1. AF Staffing Estimates Regional F&E Workload Analysis by Region						
		FY92	FY93	FY94	FY95	FY96
	Carry-Over from Prior Year	0.0	13.1	28.9	47.8	68.5
	Total Requirements	223.2	302.1	307.6	322.2	298.7
	Available F&E Staffing	165.0	181.0	181.0	181.0	181.0
	Available TSSC	44.9	92.2	78.7	72.6	70.9
	Available Other Contracts	0.1	0.0	0.0	0.0	0.0
	Total Available	210.0	273.2	259.7	253.6	251.8
	(Short Fall) Surplus	(13.1)	(28.9)	(47.8)	(68.5)	(46.8)
ANE	Requirements	153.3	193.2	175.3	175.8	102.6
	Indirect Requirements	24.3	25.5	29.8	29.6	30.0
	Carry-Over from Prior Year	0.0	64.5	160.6	241.5	317.2
	Total Requirements	177.6	283.1	365.7	446.9	449.8
	Available F&E Staffing	57.0	62.0	62.0	62.0	62.0
	Available TSSC	37.4	40.0	38.6	44.5	2.6
	Available Other Contracts	18.7	20.6	23.6	23.2	23.1
	Total Available	113.1	122.6	124.2	129.7	87.7
	(Short Fall) Surplus	(64.5)	(160.6)	(241.5)	(317.2)	(362.0)
ANM	Requirements	308.4	353.2	267.5	356.9	190.5
	Indirect Requirements	71.0	79.1	83.2	88.9	88.4
	Carry-Over from Prior Year	0.0	164.4	366.6	494.8	767.0
	Total Requirements	379.4	596.6	717.4	940.6	1,045.8
	Available F&E Staffing	148.0	161.0	161.0	161.0	161.0
	Available TSSC	62.8	66.6	61.6	12.3	5.2
	Available Other Contracts	4.2	2.4	0.0	0.3	0.2
	Total Available	215.0	230.0	222.6	173.6	166.4
	(Short Fall) Surplus	(164.4)	(366.6)	(494.8)	(767.0)	(879.5)
ASO	Requirements	272.5	377.1	470.3	284.5	123.9
	Indirect Requirements	50.2	72.9	77.9	77.9	77.8
	Carry-Over from Prior Year	0.0	72.1	162.9	365.4	439.0
	Total Requirements	322.6	522.1	711.2	727.8	640.7

Table B-1. AF Staffing Estimates Regional F&E Workload Analysis by Region						
		FY92	FY93	FY94	FY95	FY96
	Available F&E Staffing	197.5	218.0	218.0	218.0	218.0
	Available TSSC	53.0	141.2	127.8	70.8	14.7
	Available Other Contracts	0.0	0.0	0.0	0.0	0.0
	Total Available	250.5	359.2	345.8	288.8	232.7
	(Short Fall) Surplus	(72.1)	(162.9)	(365.4)	(439.0)	(408.0)
ASW	Requirements	407.0	411.3	374.2	278.6	262.1
	Indirect Requirements	91.1	100.7	120.0	119.5	113.6
	Carry-Over from Prior Year	0.0	247.1	339.2	442.6	492.1
	Total Requirements	498.1	759.1	833.4	840.7	867.8
	Available F&E Staffing	178.0	193.0	193.0	193.0	193.0
	Available TSSC	26.7	203.7	180.9	151.9	157.1
	Available Other Contracts	46.4	23.2	16.8	3.7	5.8
	Total Available	251.1	419.9	390.7	348.6	352.9
	(Short Fall) Surplus	(247.1)	(339.2)	(442.6)	(492.1)	(514.9)
AWP	Requirements	351.6	392.9	329.7	252.8	213.0
	Indirect Requirements	71.5	67.6	69.2	39.4	102.6
	Carry-Over from Prior Year	0.0	82.9	206.9	270.9	244.0
	Total Requirements	423.1	543.4	605.8	563.1	559.7
	Available F&E Staffing	177.5	191.0	191.0	191.0	191.0
	Available TSSC	36.7	40.7	40.5	29.2	32.9
	Available Other Contracts	126.1	104.8	103.5	98.8	92.8
	Total Available	340.2	336.5	334.9	319.1	316.7
	(Short Fall) Surplus	(82.9)	(206.9)	(270.9)	(244.0)	(242.9)

Notes: Requirements in FTEs (1,792 productive labor hours per year).

Table B-2. AF Workload by Equipment Type Direct Work Staffing (DWS) Only (1991 Staffing Standard Production)

Facility Type	FY92 Inventory	FY92 DWS	FY93 Inventory	FY93 DWS	FY94 Inventory	FY94 DWS	FY95 Inventory	FY95 DWS	FY96 Inventory	FY96 DWS
ACCC	0	0	0	1.1	1	2.5	2	7.9	7	19.4
ADAS	4	0.5	16	0.9	20	0.8	20	0.7	20	0.6
AFSS	62	67	64	60.3	66	60.6	67	61.8	67	61.3
AID	3	0	3	0	3	0	3	0	3	0
AIFSS	1	1.5	1	1.4	1	1.4	1	1.4	1	1.4
ALS	108	50.2	113	51.9	117	53.1	117	52.8	118	53
ARBCN	5	0.1	5	0.1	5	0.1	5	0.1	5	0.1
ARSR	117	289.5	126	291.7	129	277.6	133	274.4	135	274
ARTCC	21	217.3	21	207.4	21	214.4	21	206	21	205
ARTS	185	408.7	190	428.1	191	430.2	190	421.3	191	423
ARTSA	6	2.1	6	2	6	2.3	6	2.2	6	2.2
ASDE	18	37.1	25	61.2	31	72	32	76.8	34	79.3
ASI	626	1.8	629	1.8	632	1.7	632	1.6	632	1.6
ASR	214	164.9	223	116.4	228	109.3	227	104.6	228	104
ATBM	424	122.4	428	142.3	429	153.5	430	152.7	430	153
ATCBI	21	12.6	21	12.5	20	12.1	20	11.9	20	11.4
ATCC	8346	7.9	8364	11.3	8519	10.7	8530	7.2	8530	7.1
ATCRB	322	130.7	315	125.8	281	111.9	240	94.8	219	86.1
ATCT	446	244.7	448	240	452	241.5	451	242.4	451	241
ATIS	406	6	413	5.9	416	5.8	417	5.7	417	5.7
ATRAM	1	0.9	1	0.9	1	0.9	1	0.9	1	0.9
AWANS	2	10	2	9.8	2	9.9	2	9.8	2	9.9
AWIS	337	6.1	343	5.6	344	5.4	344	5.4	344	5.4
AWOS	204	40.5	274	47.5	298	49.2	308	50.2	316	51.3
AWP	4	8.9	4	7.4	4	8.3	4	7.1	4	7
BRITE	524	93.1	564	71.9	571	69.7	571	70.1	575	66.9
BUEC	293	21.2	298	21.4	311	22.6	316	23	316	23
CBI	113	1.9	123	1.2	126	1.1	129	1	129	1
CCCH	16	68	16	67.6	16	68.1	16	66.8	16	65

Table B-2. AF Workload by Equipment Type Direct Work Staffing (DWS) Only (1991 Staffing Standard Production)

Facility Type	FY92 Inventory	FY92 DWS	FY93 Inventory	FY93 DWS	FY94 Inventory	FY94 DWS	FY95 Inventory	FY95 DWS	FY96 Inventory	FY96 DWS
CCMS	23	1.5	24	1.3	24	1.3	25	1.3	25	1.2
CCTV	101	28	104	28.3	107	28.4	116	31.1	125	32.4
CD	205	97.1	210	97	211	103.9	212	107.2	212	106
CDC	15	77	15	75.7	15	77	15	74.4	15	72.9
CERAP	3	6.1	3	6.1	3	6.1	3	6.1	3	6.1
CHI	31	0.5	32	0.5	32	0.5	34	0.5	35	0.5
CKT	10	1	10	1	10	1	10	1	10	1
CLM	408	71.3	409	69.8	409	69.2	409	69.2	409	69.2
CMLT	23	8.1	25	7.9	25	7.7	25	7.7	25	7.7
COMCO	21	4.4	21	4.3	21	4.2	21	4.3	21	4.3
CTERM	2	0	2	0	2	0	2	0	2	0
CTRB	22	269.8	22	270.7	23	278.5	23	281.6	23	280
CTS	27	10.4	27	10.3	27	10.3	27	10.2	27	10.2
CUE	22	57.6	22	56.5	22	57.4	22	55.2	22	54.1
CWP	9	1.1	10	0.6	12	1.4	19	1.6	21	0.9
DARC	21	38.4	21	37.7	21	38.2	21	36.8	21	36.1
DCC	5	47.9	5	47.1	5	48.8	5	46.9	5	46.9
DF	287	38	314	34.9	330	34.7	337	34.2	338	33.9
DFI	213	16.5	219	15.6	222	15.2	222	15.2	223	15.1
DLP	12	2.6	18	1.9	20	1.4	20	1.2	21	1.4
DME	475	43	510	44.1	545	43.9	545	42.7	547	42.1
DMER	51	4.3	50	4.1	53	4.5	55	4.5	55	4.4
DMUX	594	89.3	613	90.5	617	91.7	619	92.3	619	92.9
DRG	21	17.9	20	16.5	18	15	18	14.7	18	14.5
DTE	906	169	912	167	914	166.8	914	168.4	914	169
EARTS	3	37.7	3	37	3	36.8	3	37.1	3	36.9
EDPS	4	7.5	4	7.5	4	7.5	4	7.5	4	7.5
ELD	7651	589.4	7656	582.7	7669	581.5	7664	580.4	7664	581
EOF	11	0.1	11	0.1	11	0.1	11	0.1	11	0.1
FDEP	1	0.5	1	0.5	1	0.5	1	0.5	1	0.5

Table B-2. AF Workload by Equipment Type Direct Work Staffing (DWS) Only (1991 Staffing Standard Production)

Facility Type	FY92 Inventory	FY92 DWS	FY93 Inventory	FY93 DWS	FY94 Inventory	FY94 DWS	FY95 Inventory	FY95 DWS	FY96 Inventory	FY96 DWS
FDIOC	23	45	23	41.9	23	41.9	23	41.1	23	40.3
FDIOR	339	33.7	364	33.8	373	32.7	372	31.9	372	31.9
FDRS	2	1	2	1	2	1	2	1	2	1
FLD	3	0.5	3	0.5	3	0.5	3	0.5	3	0.5
FM	22	1.8	22	1.7	22	1.7	22	1.8	22	1.7
FOTS	24	1.2	37	2.2	60	2.4	60	2.0	60	2.1
FSDPS	20	49.9	25	62.4	27	62.8	27	61.2	27	61.2
FSS	174	146.6	163	134	153	128.7	149	126.8	149	126
GATR	4	0.7	4	0.7	5	1	7	1.6	7	1.8
GDL	2	0.4	2	0.4	2	0.4	2	0.4	2	0.4
GFR	6	25.2	6	25.4	6	24.6	6	24.6	6	24.6
GOES	68	6.1	85	7.6	104	9	110	9	110	8.8
GPS	1	0.1	3	0.1	3	0.1	3	0.1	5	0.2
GS	837	137.3	862	137.8	874	135.6	872	134.7	872	133
GUARD	5	0	6	0	6	0	6	0	6	0
GWDS	52	3.1	56	3	58	2.9	58	2.7	58	2.7
H	226	22.6	237	21.9	235	21.1	235	21.3	238	21.4
HEAT	5	0.6	5	0.6	5	0.6	5	0.6	5	0.6
HELI	21	0.2	21	0.2	21	0.2	21	0.2	21	0.2
HH	9	2.1	9	2	9	2	9	2	9	2
ICSS	230	91.4	248	97.6	259	99	259	95.5	259	95.3
IFF	1	0	2	0	2	0	2	0	2	0
IFSS	2	4.3	2	4	2	4	2	4	2	4
IFST	3	1.9	3	1.9	3	1.8	3	1.8	3	1.9
IM	79	4.5	86	4.8	90	4.8	91	4.7	91	4.6
ISSS	1	0.8	1	1.6	3	4.6	9	10.9	15	14.9
LABS	100	0	100	0	100	0	100	0	100	0
LCOT	125	7.6	134	7.8	140	7.8	140	7.6	140	7.6
LDA	21	7.4	21	7	21	7	21	6.9	20	6.7
LDIN	18	4.6	19	4.7	19	4.6	19	4.6	19	4.6

Table B-2. AF Workload by Equipment Type Direct Work Staffing (DWS) Only (1991 Staffing Standard Production)

Facility Type	FY92 Inventory	FY92 DWS	FY93 Inventory	FY93 DWS	FY94 Inventory	FY94 DWS	FY95 Inventory	FY95 DWS	FY96 Inventory	FY96 DWS
LIVQ	205	14.2	165	11.2	153	9.1	152	9	152	9
LLWAS	111	37.3	111	36.6	112	36.2	111	35.2	111	35.3
LMM	12	0.5	12	0.5	12	0.5	11	0.4	11	0.4
LNKR	6	0.7	7	0.7	7	0.6	7	0.6	7	0.6
LOC	933	161.9	956	160.8	971	158.9	968	157.9	969	156
LOM	448	20.7	458	20.5	461	20.2	460	20.1	460	20
LRNCM	181	7.6	202	5.3	202	4.9	202	4.8	202	4.8
MALS	91	15.8	89	14.9	88	14.7	88	14.9	89	14.9
MALSR	624	149.9	656	151.6	671	152.9	671	152.1	674	153
MAPS	3	10.1	4	10.1	4	9.8	4	10.1	4	9.5
MAREQ	9	1.3	9	1.2	9	1.2	9	1.2	9	1.2
MCC	67	167.3	72	182	73	183.6	73	193.3	73	193
MCCP	20	40	29	44.2	30	51.1	30	52.1	30	52
MCR	883	82.8	914	85.8	937	86.7	936	86	936	85.9
MCT	562	0.7	564	0.7	567	0.7	567	0.7	567	0.7
MDS	60	0	64	0	65	0	65	0	65	0
MIG	4	2.1	4	2.2	4	2.4	4	2.7	4	2.8
MIM	1	0	1	0	1	0	1	0	1	0
MLSA	27	3.6	42	3.4	46	6.2	123	18.2	172	27.9
MLSBA	0	0	0	0	0	0.7	12	1.6	16	11.7
MLSD	29	3.7	44	3.4	48	6.3	126	18.3	174	27.6
MLSE	29	3.7	44	3.5	49	6.4	125	18	172	27.5
MLSF	0	0	0	0	0	0	1	0.1	1	0.1
MM	798	40.1	824	40.2	837	39.8	837	39.5	837	39
MOBIL	15	0.8	15	0.8	15	0.8	15	0.8	15	0.8
MODES	18	5.8	64	12.9	125	18.6	179	17.1	204	14
MPS	41	23.4	43	25.1	43	24.8	43	24.9	43	24.9
MX	449	17.5	449	16.7	449	16.7	449	16.7	449	16.8
NADIN	27	11.4	29	10.8	29	9.9	29	10	29	10
NMCE	16	0.7	21	0.5	22	0.4	22	0.4	23	0.4

Table B-2. AF Workload by Equipment Type Direct Work Staffing (DWS) Only (1991 Staffing Standard Production)

Facility Type	FY92 Inventory	FY92 DWS	FY93 Inventory	FY93 DWS	FY94 Inventory	FY94 DWS	FY95 Inventory	FY95 DWS	FY96 Inventory	FY96 DWS
NRCS	1086	62.7	1102	57.8	1107	57.9	1107	58.5	1107	58.6
NXRAD	0	0	1	1.7	2	3.4	11	19.0	14	24.1
OAW	57	4.1	64	4.1	66	4	66	3.9	66	3.9
ODALS	44	12.1	47	11.9	47	11.6	47	11.7	47	11.7
ODAPS	2	5	2	5	2	5.2	2	5.2	2	5.1
OFDPS	4	8.7	4	7.9	4	7.7	4	7.7	4	7.9
OFFRD	705	36.4	705	36	705	36	705	36.2	705	36.2
OLD	16	1.5	16	1.4	16	1.4	16	1.4	16	1.4
OM	803	49.6	823	49.2	835	48.9	835	48.5	835	48
PAM	20	9.9	19	9.2	17	8.3	17	8.2	17	8.1
PAMRI	9	6.9	19	6.7	20	4.3	20	4	20	3.9
PAPI	204	46.8	271	54.1	308	59	322	60.9	325	60.8
PAR	2	2.4	2	2.3	2	2.3	2	2.3	2	2.3
PCS	746	153	754	150.9	755	150.4	754	151.2	754	152
PX	18	11.8	18	11.6	18	11.1	18	10.8	18	10.8
QS	65	4.3	65	4.5	66	4.7	66	4.8	66	4.9
RAPCO	8	17.3	8	16.7	8	16.7	8	16.6	8	16.5
RBC	85	7.3	85	6.8	85	6.6	86	6.7	86	6.7
RBDE	4	3.2	4	3.1	4	3.1	4	3.1	4	3.1
RBDPE	4	4.6	4	5	5	5.5	5	5.4	5	5.4
RBPM	278	6.1	279	5.9	279	6	279	6.2	279	6.3
RCAG	665	184.7	676	175.5	682	168.3	682	164.7	682	164
RCIU	98	0.1	98	0	98	0	98	0	98	0
RCLR	726	90.3	747	84	753	83.6	755	83.8	755	84.4
RCLT	214	15.9	229	15.5	241	16.6	244	16.6	244	16.9
RCO	1741	283.8	1762	275.6	1767	274	1767	277.3	1766	276
REIL	696	39.9	725	39	740	39.1	746	39.1	748	38.8
RMCC	23	4.7	23	4.3	23	4.3	23	4.4	23	4.4
RMCF	187	53.2	187	52.2	187	51.9	187	52	187	51.8
RMLR	44	19.7	40	17.3	39	16.7	39	16.7	39	16.8

Table B-2. AF Workload by Equipment Type Direct Work Staffing (DWS) Only (1991 Staffing Standard Production)

Facility Type	FY92 Inventory	FY92 DWS	FY93 Inventory	FY93 DWS	FY94 Inventory	FY94 DWS	FY95 Inventory	FY95 DWS	FY96 Inventory	FY96 DWS
RMLT	99	40.1	91	35	90	33.6	88	33.2	85	31.6
RMSC	62	1.8	77	0.9	82	0.9	90	0.6	90	0.4
RRH	146	10.7	153	10.3	153	10	156	10.3	159	10.4
RRWDI	74	9.7	75	10.4	75	10.1	75	10	75	9.9
RRWDS	132	18.8	133	18.7	133	19	133	19.6	133	19.9
RTCCS	11	0	11	0	11	0	11	0	11	0
RTR	1214	313.2	1224	309.6	1232	307.6	1229	306.6	1229	305
RVR	512	96.3	552	94.9	573	92.1	568	90.2	569	90.6
SAL	420	7.2	420	7.1	421	7	421	7.1	421	7.1
SALS	1	0.6	1	0.6	1	0.6	1	0.6	1	0.6
SAN	3	0.3	3	0.3	3	0.3	3	0.3	3	0.3
SB	672	40.6	673	39.8	673	40.1	673	40.8	673	41
SCC	1	3	1	3	1	3	1	3	1	3
SPS	153	203.9	154	210.7	154	204	154	205.5	154	205
SRAP	68	51.1	69	50.2	70	50.2	70	49.8	70	49.8
SSALR	53	14.6	49	13.4	49	13.2	49	13.1	47	12.7
SSALS	1	0.4	1	0.4	1	0.4	1	0.4	1	0.4
SSO	16	1.1	16	1.1	16	1.1	16	1.1	16	1.1
SWG	34	3.5	34	3.7	34	3.7	34	3.2	34	3.2
TACR	663	34.6	668	33.9	671	33.9	671	33.6	673	33.5
TCCC	3	2.8	6	3.6	6	3.7	9	5.5	14	9.6
TCDD	6	1.9	6	1.8	6	1.8	6	1.8	6	1.8
TCS	6	1.5	22	6.1	52	12.3	91	21.9	123	26.4
TDDS	150	54.9	167	53.9	168	52.1	168	52.2	168	52
TDWR	1	0.1	5	1	32	4.4	54	6.4	66	7
TELEX	394	99.7	395	97.4	398	96.9	398	96.6	398	97.1
TIM	593	143.8	596	144.5	600	144.6	600	142.9	600	143
TIPS	26	12.9	28	14.3	29	15.2	29	14.9	29	14.8
TMCC	3	10.8	4	13.2	4	14.4	4	14.2	4	14.2
TMLI	141	6.5	153	6	155	5.8	154	5.7	155	5.8

Table B-2. AF Workload by Equipment Type Direct Work Staffing (DWS) Only (1991 Staffing Standard Production)

Facility Type	FY92 Inventory	FY92 DWS	FY93 Inventory	FY93 DWS	FY94 Inventory	FY94 DWS	FY95 Inventory	FY95 DWS	FY96 Inventory	FY96 DWS
TMLR	112	7.9	119	7.4	121	7.2	121	7.2	121	7.2
TMLT	150	12.3	165	12.2	166	11.9	163	11.7	163	11.7
TMU	39	1.8	42	1.7	47	1.6	48	1.5	48	1.5
TOWB	307	147.7	311	147.6	315	150.7	315	150.8	315	151
TR	1220	62.1	1221	61.2	1221	61.5	1221	61.7	1221	61.7
TRACO	24	51.1	26	55.5	27	55.4	27	55.3	27	55.3
TTY	4	1.5	4	1.5	4	1.5	4	1.5	4	1.5
TWEB	115	2.1	116	1.9	116	1.9	116	1.9	116	1.9
UB	865	90.2	866	89.2	860	89.1	860	89.4	860	89.7
VASI	1363	117	1363	113.8	1358	113.1	1356	113.2	1352	113
VEHS	3094	50.1	3096	49.4	3098	49.6	3098	49.9	3098	50.2
VOR	948	227.7	964	227.1	993	230.6	997	230.2	1000	230
VOT	93	8.3	103	6.3	108	6	110	6.1	112	5.9
VSCS	1	0.9	3	1.8	10	6.3	19	10.6	22	11.1
WMSC	1	10.8	1	10.8	1	10.8	1	10.8	1	10.8
WMSCR	3	35.8	3	35.1	3	34.6	3	35.5	3	35.5
WSM	51	9.1	51	9.4	51	9.8	51	8.8	51	8.9
Total	----	**8345**	----	**8299**	----	**8330**	----	**8365**	----	**8401**

Notes: Data is presented in FTEs which are defined as full-time-equivalent employee-years. One FTE of workload can be covered by a full-time-permanent employee who is employed for the entire year or by a mix of other than full-time permanent employees equaling the effort of a full-time permanent employee. For maintenance, an FTE is calculated using the compensable hours per year less 15% for nonproductive hours spent in leave and holidays (1770 productive labor hours per year).

Table B-3. FAA Logistics Center Functions		
Organization	**Function**	**Source**
AAC-430	Warehousing	FAA
AAC-440	Engineering and Production	FAA & Contractor
	Metrology Services	Contractor
	Non-Metallic Shop Services	Contractor
	Drafting Services	Contractor
	Engineering Support Services	Contractor
	Technical Library Services	Contractor
AAC-450	Quality Control	FAA
AAC-480	Supply Management	FAA
AAC-490	Cataloging	Contractor

APPENDIX C

NAS HRM COMMITTEE MEMBERS

NAS HRM STEERING COMMITTEE MEMBERS

Neil Planzer	ATZ-1
Walt Mitchell	ATR-1
Dave Morse	ASM-1
Jim Stagner	ANS-2
Dave Carmichael	AAC-2
Lou Bona	ACN-1
Ruth Leverenz	ABU-1
Mike Perie	AAP-1
Larry Andriesen	ANM-2
Ann Rosenwald (chair)	AHD-1

NAS HRM WORKING COMMITTEE MEMBERS

Mary Barnett	ATZ-300
Terry Snyder	ATR-310
Mark Erb	for ASM-200
Tom Proeschel	ANS-100
Dot Tharnish	AAC-15
Vince Lasewicz	ACN-140
Kay Kennedy-Roberts	ABU-220
Philip Gill	AAP-201
Karen Franco (chair)	AHD-300

HUMAN RESOURCE REQUIREMENTS VALIDATION TEAM (HRRVT) MEMBERS

Nicholas Richards	AAC-940A
Ken Towery	AAC-402
Sam Hendrix	AAC-935
Sue Spurgeon	ACM-104
Tom Rourke	PASS
Dwayne Williams	ASM-250
Edgar Saylor	AEA-AFS-840
George Peurifoy	ZTL-560
Owen Bridgeman	NATCA (P50)
William Ball	NATCA (Z58)
Dave Pinner	AGL-13
John Fung	AWP-11
Pat Pierce	ANM-14

GLOSSARY

AAC	Mike Monroney Aeronautical Center
ACC-60	Management Services Division
AAC-334	Training Systems Section
AAC-430	Storage and Transportation Branch
AAC-440	Engineering and Production Branch
AAC-920	Program and Project Management Branch
AAF-12	F&E Resource Branch
AAL	Alaska Region
AAP	Advanced Automation
AAS	Advanced Automation System
ABU	Office of Budget
ACCC	Area Control Computer Complex
ACE	Central Region
ACF	Area Control Facility
ACN	Engineering, Test, and Evaluation Service Director
ACT	FAA Technical Center
AEA	Eastern Region
AF	Airway Facilities
AFTRVT	AF Transition Requirements Verification Team
A/G LPA	Air to Ground Linear Power Amplifier
AGL	Great Lakes Region
AHD-1	Office of Human Resource Development
AHD-300	Human Resources Management Planning and Research Division
AHR-1	Assistant Administrator for Human Resource Management
AHT-1	Office of Training and Higher Education
AIP	Airport Improvement Program
AIR	Aircraft Certification Service
AMASS	Airport Movement Area Safety System
ANE	New England Region

ANM	Northwest Mountain Region
ANS	NAS Transition and Implementation Service
APMT	Associate Program Manager for Test
APN-200	Staffing Policy Division
ARSR	Air Route Surveillance Radar
ARTCC	Air Traffic Control Center
ARTS	Automated Radar Terminal System
ASDE	Airport Surface Detection Equipment
ASE	NAS System Engineering Service
ASE-100	Automation Division
ASM	Systems Maintenance Service
ASM-200	Maintenance Operations Division
ASO	Southern Region
ASOS	Automated Surface Observing System
ASR	Airport Surveillance Radar
ASW	Southwest Region
AT	Air Traffic
ATC	Air Traffic Control
ATCBI	Air Traffic Control Beacon Interrogator
ATCBIRE	Air Traffic Control Beacon Interrogator Replacement
ATCS	Air Traffic Control Specialist
ATCT	Airport Traffic Control Tower
ATR	Air Traffic Plans and Requirement Service
ATTRVT	AT Transition Requirements Verification Team
ATZ	Office of Air Traffic Program Management
ATZ-300	Air Traffic Office of Resource Management Program
AVS	Associate Administrator for Aviation Standards
AWOS	Automated Weather Observing System
AWP	Western Pacific Region
AXA-1	Executive Director for Administration and Resource Management
AXD-1	Executive Director for System Development

AXO-1	Executive Director for System Operations
AXR-1	Director for Regulatory Standards and Compliance
BRITE	Bright Radar Indicator Tower Equipment
CBI	Computer Based Instruction
CBT	Computer Based Training
CDP	Candidate Development Program
CIP	Capital Investment Plan
CONUS	Continental United States
CPMIS	Consolidated Personnel Management Information System
CSCS	Cost Schedule Control System
DCT	Detached Console Trainer
DF	Direction Finder
DLP ENH	Data Link Processor Enhancements
DME	Distance Measuring Equipment
DOD	Department of Defense
DOT	Department of Transportation
DWS	Direct Work Staffing
DYSIM	Dynamic Simulation
E&R	Exchange and Repair
EDS	Enhanced Debrief Station
EOY	End-of-Year
ERMS	Environmental Remote Monitoring System
F&E	Facilities and Equipment
FAA	Federal Aviation Administration
FAR	Federal Acquisition Regulations
FDEN	Flight Data Entry Notation
FEPCA	Federal Employees Pay Comparability Act
FS	Flight Standards
FSAS	Flight Service Automation System
FTE	Full Time Equivalent
FY	Fiscal Year

GFE	Government Furnished Equipment
GNAS	General NAS
HFCC	Human Factors Coordinating Committee
HRM	Human Resource Management
HRRVT	Human Resource Requirements Validation Team
ICSS	Integrated Communication Switching System
IFR	Instrument Flight Rules
IIDS	Interactive Instructional Delivery System
ILS	Instrument Landing System
IOC	Initial Operating Capability
ISP	Interim Support Plan
ISSS	Initial Sector Suite System
IVI	Interactive Video Instruction
JAI	Joint Acceptance Inspection
JSS	Job Satisfaction Survey
JTA	Job Task Analysis
KSAs	Knowledge, Skills, and Abilities
LLWAS	Low Level Wind Shear Alert System
LOE	Level of Effort
LRR	Long Range Radar
LSA	Logistic Support Analysis
MATES	Modular Applicant Testing, Examining and Screening
MCC	Maintenance Control Center
MDFM	Master Delivery Forecast Module
MLS	Microwave Landing System
Mode S	Mode Select
MSS	Managerial Selection System
NADIN	National Airspace Data Interchange Network
NAILS	National Airspace Integrated Logistics Support
NAS	National Airspace System
NATCA	National Air Traffic Controllers Association

NSN	National Stock Number
NWS	National Weather Service
OEM	Original Equipment Manufacturer
OMB	Office of Management and Budget
OPM	Office of Personnel Management
OPS	Operations
ORD	Operational Readiness Demonstration
OST	Office of the Secretary of Transportation
OT&E	Operational Test and Evaluation
PAMRI	Peripheral Adaptor Module Replacement Item
PASS	Professional Airways Systems Specialists
PD	Program Directive
PLD	Productive Labor Day
PM	Preventative Maintenance
PRM	Personnel Resource Module
QMB	Quality Management Board
R&D	Research and Development
RAMBO	Resource Allocation Management Board
RMM	Remote Maintenance Monitoring
RPMS	Regional Project Management System
RTF	Radar Training Facility
RVR	Runway Visual Range
RWP	Real-Time Weather Processor
SACHA	Separation and Control Hiring Assessment
SEIC	Systems Engineering and Integration Contractor
SES	Senior Executive Service
SFA	Survey Feedback Action
SIDP	Supervisory Identification and Development Program
SSAS	Staffing Standards and Analysis System
STARS	Staffing and Training Analysis Requirements System
STVS	Small Tower Voice Switch

TAAS	Terminal Advanced Automation System
TAG	Terminal and General NAS
TCCC	Tower Control Computer Complex
TCS	Tower Communication System
TDWR	Terminal Doppler Weather Radar
TERM RAD DIG	Terminal Radar Digitizing, Replacement, and Establishment
TOTS	Tower Operating Training System
TRACON	Terminal Radar Approach Control
TSSC	Technical Services Support Contract
TVSR	Terminal Voice Switch Replacement
UPS	Uninterruptible Power System
VASI	Visual Approach Slope Indicator
VCET	Voice Communications Equipment Trainer
VSCS	Voice Switching and Control System
WMSC	Weather Message Switching Center

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An Office of Management and Budget directive prescribing a methodology and a process used by Government agencies in order to decide between continued Government performance of a service or the accomplishment of that service by the commercial sector.

equipment and service availability

Average facility up-time, representing the amount of time that facilities are operating and providing service to their customers, calculated by dividing the total number of hours in a year diminished by the number of unscheduled equipment down-time hours by the total number of hours in a year and expressing that measure as a percent.

full-time equivalent

The unit of measure for the number of productive, compensable employee-years of workload performed by career civil servants.

inventory

The number of facility-years which require in-house maintenance. Facility-years represent the equivalent number of facilities which must be maintained for one year. In-house maintenance means maintenance by career civil service operations maintenance personnel located in the AF sectors.

journey-level work force augmentation

An immediate addition of personnel who are already equipped with the full range of qualifications needed to perform skilled workload requirements.

new hire training

Training given to new AF employees to ensure a common level of basic electronics competence prior to providing equipment specific training.

normal hours

FAA personnel working during regularly scheduled shifts for which they do not receive any overtime pay or compensatory time benefits.

sensitivity analyses

Those analyses conducted to examine the impact of changes in various parameters or variables included in a model on outcome measures, such as controller workload, transition requirements, training schedules, or costs. For example, in a workload requirements model, one may vary the frequency with which a task is performed to examine overall impact on workload or staffing requirements for a sector or ARTCC. By running the analysis with several different task frequency values, one can examine the "sensitivity" of workload to task frequency.

staffing standard

A formal set of rules usually expressed in a directive or order, used to determine the number of people necessary to perform a particular job for a specified period of time.

CIP PROJECT DEFINITIONS

ACCC (Area Control Computer Complex) - The ACCC will provide an automated radar approach control within an ARTCC. This phase will complete the evolution of ARTCCs to area control facilities. The ACCC is automation hardware equipment, software, and a local area network (LAN) which provides automation support for the control of aircraft in a volume of airspace under the air traffic jurisdiction of an air route traffic control center (ARTCC)/area control facility (ACF). This facility represents the center element of the advanced automation system (AAS). This is a collocated facility having no environmental staffing.

ACF (Area Control Facility) - ACF concept plans improved ATC service to users, increased ATCS capabilities, and economical ability to absorb growth in air traffic demand through consolidation of ATC facilities. ACFs are anticipated to have control area boundaries based upon operational need and traffic flow throughout large geographical areas, including all programmed terminal and en route airspace. ACFs will provide en route ATC and terminal approach/departure control, will provide a full range of radar services to all terminal radar sites, and will provide full time service to all networked locations.

ADAS (AWOS Data Acquisition System) - This system is located at center/ACF facilities. The ADAS collects, analyzes, and redistributes weather information to support the National Airspace System (NAS). The ADAS receives minute-by-minute AWOS (also ASOS, non-Fed AWOS and DOD AOS) weather messages and distributes these messages to the DLP and CWP (MWP/RWP), collocated and adjacent, facilities. Hourly and special weather messages will also be distributed to the WMSCR. This is a collocated facility having no environmental staffing.

AFSS (Automated Flight Service Station) - A computerized central operations facility in the flight advisory system. It has automated data acquisition and transmission capability for centralized flight plan processing and flight advisory services; i.e., weather information consolidation and dissemination, notices to airmen (NOTAM), pilot briefings, and other en route and terminal flight services in the NAS. It may also provide aeronautical point to point communications such as flight plan processing, weather information, search and rescue action, and other flight assistance operations to pilots operating over international territory or waters. Environmental workload will be point-counted in the ATBM or CTRB facility, as appropriate. Engine generator workload is identified by power source code for the ATBM configuration (see Order 6000.5). AFSS encompasses automation equipment only; Communications equipment is captured under the FSS, MCT, and RCO facilities.

AID (Airport Information Desk) - The AID facility is an unmanned terminal in the flight advisory system providing minimum service consistent with airport sponsor requirements using a flight-planning desk, a service "A" teletypewriter (receive only), and weather condition indicators. This facility may utilize a "1-800" telephone service in lieu of the service "A" teletypewriter. This facility generates no environmental staffing.

ALS (Approach Light System) - The ALS is a high intensity approach light system with sequence flashers. It is an airport runway lighting facility providing guidance by radiating high intensity focused light beams in a directional pattern by which the pilot visually aligns the aircraft with the extended centerline of the runway. Staffing values are assigned by facility class which defines a system by its configuration and category of operations and includes all environmental maintenance for the facility. Engine generator staffing values are determined by power source code (see of the latest edition of Order

6000.5, Facilities Master File). No distinction is made, in classes, between landline, ground to ground (G/G), air to ground (A/G), etc., since the associated workload, for the addition of communications, totals only some 6 man-hours per year (Negligible and is included in all allowances).

ARBCN (Airway Beacon) - The ARBCN is a lighting facility in the air route navigation system providing a rotating or flashing light beam with auxiliary red course lights aligned on the front and back courses using coded flashes to indicate location of the airway.

ARSR (Air Route Surveillance Radar - FAA and Military) - The ARSR is a radar facility used to detect and display azimuth, range, and elevation (ARSR-4) of en route aircraft operating between terminal areas. Staffing values include building and grounds, heating, ventilation, air-conditioning, and other utilities. The motor alternator/generator is a power conditioning system separate from standby power. Engine generator staffing values (UPT included) are determined by the power source code.

ARTCC (Air Route Traffic Control Center) - The ARTCC encompasses the en route air traffic control system air/ground radio communications which provides safe and expeditious movement of aircraft operating on instrument flight rules (IFR) within the controlled airspace of the center. This is all the equipment from and including the controller's position to and including FAAs demarc. It includes all channel equipment, tone channeling, amplifiers, tie lines, regulators, power supplies and associated jacks, and jack fields needed to send and receive communications from a local or remote communications facility. This is a core facility with staffing values determined by the number of radio positions/channels. This is a collocated facility having no environmental staffing.

ARTS (Automated Radar Terminal System) - A terminal facility in the air traffic control system using radar intelligence to detect and display pertinent data such as flight identification, altitude, and position of aircraft operating in the terminal area. Staffing values include maintenance of video mappers, disk drives, printers (medium speed), continuous data recorders (CDR), noncommon decoders, control panels, etc., and all the associated radar indicator type equipment previously captured under TRACO prior to ARTS conversion. Communications equipment is counted against ATCT/TRACO/RAPCO. The allowance for ARTS excludes items associated with ATCT, BRITE, RAPCO, SRAP, TIPS, BANS, and TRACO equipment systems. This is a core facility. ETG and maintenance DEDS/RADS are to be counted and included. Environmental workload is captured under ATBM or TOWB dependent upon configuration and location; e.g., in the tower, displaced from the tower, etc.

ARTSA (Automated Radar Terminal System Assembly) - A facility comprised of high speed printer (HSP), card reader, tape drives, and card punch equipment (Univac 9300 or equivalent) required for software program assembly functions in building operational programs, patches, etc. for ARTS III facilities. The standard medium speed printer (MSP), card reader, tape drives (Kennedy, etc.) are not to be included. This is a collocated facility having no environmental staffing.

ASDE (Airport Surface Detection Equipment) - A short range airport radar facility in the terminal air traffic control system used to detect and display ground targets such as aircraft, vehicles, and other objects enabling an air traffic control specialist to expedite aircraft movement during conditions of reduced visibility.

ASI (Altimeter Setting Indicator) - The ASI system provides numerical values of the local barometric pressure. Staffing values include the associated equipment required for sensing, conversion, encoding and decoding the resultant data supplied to the indicator(s). Portable aneroid devices used for testing and

calibration are excluded. This is a collocated facility having no environmental staffing. Only one ASI facility will be established and listed on the FSEP for each control location.

ASOS (Automated Surface Observing System) - This system includes automatic weather data acquisition, processing, recording, display, and transmission functions. The standard facility may include wind, temperature, dew point, atmospheric pressure, precipitation, visibility, and/or cloud height indication (CHI) capability built-in. A Class B facility shall not also show a CHI facility in the FSEP. For stand-alone and/or external CHI facilities, see CHI contraction. This facility is the weather bureau equivalent to the FAA AWOS. The laser beam ceilometer (LBC) is a component of this facility which provides the cloud height indication parameter. LBC is an interim support element which will evolve into a full ASOS facility. Class C is established for capturing the LBC stand-alone configuration only. Staffing values include environmental support.

ASR (Airport Surveillance Radar - FAA and Military) - A radar facility in the terminal air traffic control system used to detect and display the azimuth and range of aircraft operating in airport terminal areas, enabling an air traffic control specialist to provide air traffic control and advisory service to pilots. Staffing includes buildings and grounds, HVAC, and other environmental support utilities. Engine generator staffing values (UPT included) are determined by the power source code.

ATBM (Airway/Terminal Building Maintenance) - This facility provides environmental support staffing values for structures/space or equipment which is not included in any other facility allowance; e.g., ARTS (Not collocated with the tower), stand alone flight service facilities, TRACO (Not collocated with the tower), stand-alone sector/sector field offices, CBI, and other stand-alone buildings if not collocated with tower base/ARTCC buildings (medical building, child care facility, etc). This is a point-count facility and staffing is based on the percent of total workload, generated by the equipment inventory, which is actually accomplished by FAA personnel. This inventory includes air-conditioning, heating, water systems, electrical power distribution, janitorial and grounds, elevators, rest rooms, etc. Environmental workload associated with tower facilities will be captured under TOWB. See table 6 of appendix 2 for equipment/system point-count values. Pseudo ATBMs (those with a Z added to the location identifier) are no longer authorized since staffing values for ILS systems have been updated to include the electrical and air conditioning workloads. ARSR facilities, and other like facilities, are not permitted to establish this facility since the facility standard includes the environmental workload.

ATCBI (Air Traffic Control Beacon Interrogator) - A ground-based facility that interrogates an airborne transponder and receives replies permitting a positive means of identifying aircraft for air traffic control purposes. This is a beacon-only facility and staffing values include building, grounds, and environmental workload. The CD will be considered as a separate facility collocated with the ATCBI. Engine generator staffing values are determined by the power source code. (See the latest edition of order 6000.5.) Staffing values include environmental support.

ATCC (Air Traffic Controller Chair) - An ergonomic design office chair modified to conform to the specific requirements of air traffic control. This is a multiple unit facility with staffing values per unit (chair).

ATCRB (Air Traffic Control Radar Beacon) - A ground-based facility that interrogates an airborne transponder and receives replies, permitting a positive means of identifying aircraft for air traffic control purposes. This radar beacon is collocated with ARSR and ASR facilities and includes the defruiter equipment in its workload, but has no allowance for environmental workload. (See ATCBI for beacon only facility.)

ATCT (Airport Traffic Control Tower) - The terminal air traffic control system air/ground radio communications utilized for safe and expeditious movement of aircraft operating within the controlled airspace of the tower. This is all the equipment from and including the controller's position to and including FAAs demarc. It includes all four channel equipment, tone channelling, amplifiers, tie lines, regulators, power supplies and associated jacks, and jack fields needed to send and receive communications from local or remote communications facilities. This is a core facility and staffing values are determined by the total number of radio positions combined for both the tower and the approach control facility (training positions are not counted). A radio position is defined as a location which provides air traffic the operational capability of establishing and maintaining radio communications with aircraft. Emergency transceivers are included in the staffing values. An RTR facility, with suffix Z added to the location identifier, should be established in the FSEP to capture all transmitters, receivers, and etc., installed in the equipment room or tower building. Maintenance transceivers are captured under the MCT facility alpha. Environmental support is counted against TOWB or ATBM dependent upon facility configuration and location relative to the tower building. Engine generator workload is identified by power source code.

ATIS (Automatic Terminal Information System) - This system records the latest terminal information such as active runway number, altimeter setting, wind direction, wind speed, etc., and provides continuous audio to a remote transmitter to relieve air traffic personnel from continually repeating this information. This is a collocated facility having no environmental staffing.

ATRAM (Aerial Tramway) - This facility system is used to transport personnel, equipment, and supplies needed to maintain high altitude and difficult access airway facilities.

AWANS (Aviation Weather and NOTAM System) - An equipment system in the flight advisory system which processes and automatically displays weather and NOTAM data for use by flight service specialists in providing airport and en route advisories, pilot briefings, and flight plan handling services. This is a collocated facility and generates no environmental staffing.

AWIS (Airport Weather and Information System) - This facility is composed of one or more integrated keyboard/modem teleprinters with processing and memory capability used to communicate information between towers, TRACONs, flight service facilities, centers, National Weather Service (NWS) field offices, and other operating facilities. Type I send/receive (S/R) and receiver-only (RO) are automatic dial-up terminals used in conjunction with public switched telephone networks while Type II S/R and RO terminals are used on multipoint private telephone lines. Both Type I and II terminals have discrete functions which allow editing of messages prior to transmitting automatic message receipt acknowledgement and diagnostic self tests on command. The AWIS teleprinters will replace electrowriters on a one-for-one basis. A collocated facility, classes A through E, does not generate environmental staffing. While stand-alone facilities, classes F through J, do include environmental staffing values. Staffing values are determined by the number of units (a unit being a teleprinter).

AWOS (Automated Weather Observing System) - This system includes automatic weather data acquisition, processing, recording, display, and transmission functions. The standard facility may include wind, temperature, dew point, atmospheric pressure, precipitation, visibility, and/or cloud height indication (CHI) capability built-in. A Class B facility shall not also show CHI facility in the FSEP. For stand-alone and/or external CHI facilities, see CHI contraction.

The AWOS project equipment will obtain aviation weather data through the use of automated sensors. Systems located within an ACF area will be consolidated for use within the ACF, for national distribution

throughout the NAS and to the NWS, for Flight Service Stations, for terminal facilities serving local airports, and for use by pilots (via air-ground radio communications) who are operating to/from airports without ATC (i.e., "non-towered" facilities).

AWP (Aviation Weather Processor) - The AWP will be established with "Model 1 Full Capacity" at the two NADIN switching centers. The AWP provides a centralized capability for the flight service automation system (FSAS) to collect and process alphanumeric weather and NOTAM information for dissemination to FSDPSs. Manual editing of all alphanumeric weather and aeronautical information specifically for the FSAS is centralized at the two AWPs.

BRITE (Brite Radar Indicator Terminal Equipment) - This facility type provides a TV type display of air traffic control or weather data in conjunction with ATCT, TRACO, ARTS, RAPCO, or RBDPE facility type operations. BRITE is a separate facility and its inventory is not to be point-counted against any other facility type. The BRITE generates no environmental staffing. BRITEs fed by different radars are separately identified in the FSEP for manpower allocation and performance reporting purposes.

BUEC (Backup Emergency Communications) - This system is a backup air-to-ground radio communications facility, generally remotely located, using tuneable transceivers serving a center's control area. The class of this facility is determined by the number of transceivers. The BUEC transceivers located at a center will be listed as a separate BUEC facility in the FSEP. This is a collocated facility having no environmental staffing.

CBI (Computer Based Instruction) - The CBI system is used to provide training in basic principles and conceptual knowledge and includes some work task simulations. A standard facility consists of a CBI terminal and keyboard interfacing with the FAA Academy or contract systems, disk drives, color monitor, video players, and a slide tape projector. Electronic test equipment such as an oscilloscope, volt ohmmeter, signal generator, power supply, etc. is used for laboratory training. A library consisting of books, video and audio tapes, slides, training materials, and other training aids is also provided. Environmental workload, where generated, shall be point-counted against ATBM or TOWB as appropriate.

CCCH (Central Computer Complex Host) - The CCCH provides the data processing computation, data storage, and hard copy printout functions necessary to execute the automatic processing of air traffic control data. It serves as the focal point of the supplemental alphanumerics system and includes all the central processing and input/output devices at a center. This is a collocated facility having no environmental staffing.

CCMS (Central Control Monitoring System) - The CCMS incorporates hardware and software for the makeup of a computerized system with the capability for monitoring and controlling a variety of environmental conditions throughout a facility. It is a centralized system with sensors strategically placed throughout the facility feeding their parameters back to the computer for monitoring and control purposes. Power input, air conditioning and handling, chilled water temperatures, hot water temperatures, heating, power consumption, and security of the building are all examples of conditions which can be monitored with this system. Remote control of parameters can also be accomplished from the centralized point. Hard copy and audible alarms are provided at the computer and to other designated points such as the MCCP or other sector control points.

CCTV (Closed Circuit TV) - A system which accepts, processes, distributes, and displays operational data for use by air traffic controllers and flight advisory specialists. The system accepts televised weather

condition data, weather graphics, NOTAMs, radar data, etc. This is a collocated facility having no environmental staffing.

CD (Common Digitizer) - A digital data processing facility used at en route radar or beacon only sites (either collocated or within 300 feet of the radar tower), which accepts broadband input from ARSR and/or beacon data acquisition equipment and converts these analog signals to digital message format for transmission by narrowband capability landlines or carrier equipment. At joint use, military-owned radar facilities, the physically associated MIG processes gap filler analog inputs for use in the military surveillance system. At ARSR-3 sites, the CD functions are built into the ARSR-3 and are included there for staffing purposes, but are identified as a CD pseudo facility for outage reporting impact assessment purposes. The CD staffing allowance includes the workload associated with the maintenance of equipment, transmission line checking, etc. This is a collocated facility having no environmental staffing.

CDC (Computer Display Channel) - This system provides visual display of digital radar data for center facilities. The CDC accepts data display messages from the CCCH and generates alphanumerics, symbolics, weather contour, and map data on plan view displays (PVD). Maintenance of all spare or standby displays is included in the total staffing values as well as the maintenance of the systems maintenance monitor console (SMMC). This is a collocated facility having no environmental staffing.

CERAP (Combined Center/RAPCO) - A combined air route traffic control center and radar approach control facility utilizing surveillance and long range radar equipment in conjunction with air/ground communications equipment for providing en route and terminal area traffic control. In accordance with chapter 4, staffing is determined by point-count and excludes maintenance of building, grounds, and utilities. This environmental workload is captured under the CTRB facility.

CHI (Cloud Height Indicator) - This weather data acquisition facility uses a laser beam transmitter, a reflection detector, a processor/maintenance unit and digital display units, giving the cloud height in feet for use by terminal air traffic control personnel. The system generates a pulsating laser beam in a vertical direction, receives the laser beam reflection from the cloud base, converts the reflected laser pulses into digital format for transmission to local ATC display units and also in American Standard Code for Information Interchange (ASCII) for teletype circuits.

CIC (Customs Interface Controller) - The CIC is used for interfacing the center computers with the Customs Service security equipment and systems utilized at airports and other locations. These will be located at Albuquerque, NM; Miami FL; Palmdale, CA; and Oakland, CA. This is a core facility which is collocated having no environmental staffing.

CLM (Control Line Maintenance) - This facility classification provides staffing values for the maintenance of FAA-owned or -maintained control, communications, and video lines/cables associated with the control facility only; Intrabuilding wiring/cabling excluded. The class of this facility will be determined by the number of pairs in use multiplied by the number of cable feet (from demarcation to demarcation); e.g., a 26-pair cable, 200,000 feet in length, equals 5,200,000 foot/ pair (FT*PR) cable. Locations having less than 100,000 FT*PR in use will not constitute a separate CLM facility. Only one FSEP entry per control facility is authorized. See ELD for power cable and TIM for telephone cable.

CMLT (Communications Microwave Link Terminal) - A terminal microwave facility operating at 8.4 GHz or lower frequency band and used for voice/data communications. This facility may be replaced by RCLT in the replacement/trunking program. See RCLT. This is a collocated facility having no environmental staffing.

COMCO (Command Communications Outlet) - A facility consisting of data transmitters/receivers, teletypewriters, crypto, and recording units integrated as an equipment system communications function for Washington headquarters, regional offices, centers (ARTCCs,), etc. This is a point-count facility. Staffing is determined by equipment inventory in accordance with chapter 4. This facility generates no environmental staffing.

CTERM (Computer Terminals) - This facility is composed of computer terminals, printers, modems, etc., utilized in the NAS. Administrative terminals and word processors are excluded. Its capability includes the acceptance, processing, distribution, storage, display, and printing of messages under program control or by manual command. Examples include National Airspace System Plan (NAPRS) equipment, input/output terminals (IOTs), maintenance data terminals (MDTs), etc., or such devices if not included in the facility standard for which it may be a part of. This is a core facility with class determination by the number of units. One unit consists of a terminal, modem, controller, display, and printer or any combination for a total of four of these items. This is a collocated facility having no environmental staffing. This facility replaces data terminal equipment (DTE).

CTRB (Center Building Maintenance) - This facility classification provides for the center, EARTS, and CERAP building maintenance requirements (including engine generators), janitorial, air-conditioning, heat, water, sewerage, grounds maintenance, and building electrical services. The CCMS and power conditioning system (PCS) are not included in CTRB and shall be entered as separate line items in the FSEP. This is a core facility with staffing based on the percent of total workload which is actually accomplished in-house (FAA).

CTS (Coded Time Source) - This system includes the time system master/slave clocks and appurtenant (centers only). This is a collocated facility having no environmental staffing.

CUE (Computer Update Equipment) - This is the equipment associated with flight data processing which provides information and input capabilities at each controller position via CRT output and keyboard input. It includes the nonradar keyboard multiplexers (NRKM), common logic unit equipment (CLUE), quick action keyboard (QAKB), etc. This is a collocated facility having no environmental staffing.

CWP (Central Weather Processor) - The CWP is a system composed of two elements, meteorologist weather processor (MWP) and real-time weather processor (RWP). The MWP is a computer-based, interactive meteorological data processing service. The RWP will mosaic NEXRAD radar and provide these products and other time-critical and operationally significant weather information for use by air traffic controllers via the advanced automation system (AAS). The RWP will also transmit a subset of its weather products to the data link processor (DLP) for uplink to pilots via the MODE S data link. Full system capacity will be achieved in two phases; Phase I MWP only and Phase II MWP and RWP. This is a collocated facility having no environmental staffing.

DARC (Direct Access Radar Channel) - This solid-state facility equipment subsystem accepts, automatically processes, and distributes digitized radar data for display on ATC consoles. It is a backup system to the CDC/DCC. This is a collocated facility having no environmental staffing.

DCC (Display Channel Complex) - This facility equipment system provides visual display of digital radar data for en route air traffic control facilities. This display channel complex is used with HOST computer configurations at some NAS Stage A centers which utilize the 9020E in the DCC channel in lieu of the CDC. Maintenance of all spare or standby PVDs, keyboards, radar keyboard multiplexers (RKM),

display generators (DG), and the SMMC are included in the total staffing values. This is a collocated facility having no environmental staffing.

DF (Direction Finder - UHF/VHF) - A radio receiver operating in the ultra high frequency (UHF) or very high frequency (VHF) band equipped with a directional sensing antenna used to take bearings on aircraft transmitters. It receives the aircraft radio signals, processes them, and provides a visual display of the direction of the aircraft relative to the facility on the control facility indicator console. Staffing is included for facility antenna systems, receiver, one simulator (when collocated at the flight service facility), receiver site indicator, remoting equipment, and environmental support (if stand-alone; i.e., Class C). If collocated, no environmental staffing is generated.

DFI (Direction Finder Indicator) - This facility is located at a control facility such as a flight service facility. It consists of the indicator and remoting equipment for processing information from remote DF receiver sites and providing a visual display of the direction of the aircraft relative to the facility on the control facility indicator console. A simulator may be included for training purposes. This is a collocated facility having no environmental staffing.

DLP (Data Link Processor) - This system consist of a SEQUOIA System 200 fault tolerant computer system employing a central processor and a number of input/output (I/O) and mass storage devices. The DLP will respond to airborne NAS user requests for weather products using the mode select (MODES) beacon system data link. These systems will be installed at the center/ACF facilities only. This is a collocated facility having no environmental staffing. This facility replaces the WCP.

DME (Distance Measuring Equipment) - A terminal area or en route navigation facility consisting of a transponder which automatically transmits encoded signals in response to airborne equipment interrogations providing the pilot with direct readout indication of aircraft distance from the identified DME facility. If collocated, no environmental staffing is generated.

DMER (Distance Measuring Equipment Remaining) - A terminal or en route navigation facility using tactical air navigation (TACR) type equipment with only the distance measuring portion of the facility commissioned and the azimuth antenna disabled, but still installed at the site.

DMUX (Data Multiplexer) - A data multiplexer, such as the paradyne modem, enabling a number of independent data transmission requirements to be consolidated in a single transmission channel whose speed equals the sum of the input channels. The data multiplexing network (DMN) uses this technology to interconnect many FAA facilities, providing multiple data transmission paths with a minimum number of discrete channels. This equipment consist of modems, multiplexers, automated network management system (ANMS), clock boxes, channel service units/data service units (CSU/DSU), and various ancillary equipment including digital A/B switches, port sharing devices, modem sharing devices, hot standby switches, and patch panels. The ANMSs will be located at centers only providing real-time monitoring, redundant paths, and automatic switching capabilities. Each modem is considered a unit. This facility covers all modems not otherwise captured as part of another facility. This is a collocated facility having no environmental staffing.

DRG (Data Receiver Group) - This facility is the equipment which provides the interface with modems, DARC, HOST, radars, and the SMMC/ESMMC/MCCP in centers. This is a collocated facility having no environmental staffing.

EARTS (En route Automated Radar Tracking System) - A system using radar data processing and display equipment to provide alphanumeric tracking and flight data distribution. EARTS can perform both terminal and en route air traffic operational functions. This is a collocated facility having no environmental staffing.

EDPS (Electronic Data Processing System) - An en route or terminal computer facility and associated peripheral equipment used for high speed air traffic control data processing. This facility accomplishes the functions normally handled by the FDEP, FDRS, and FDIO facilities. Examples include Honolulu's IBM system 7 and Anchorage's HP 1000 systems. This facility may be established at locations, to capture this workload, provided it is not being captured under another facility alpha. This is a collocated facility having no environmental staffing.

ELD (Electrical Distribution System) - An electrical power distribution system (underground or overhead) extending from a PX or commercial utility termination to the load distribution a combined distance of 1,000 feet or more. Intrafacility wiring/cabling is not to be included. Staffing values include maintenance of all transformers, primary power lines (underground or overhead), utility poles, guy wires, anchors, etc. This is a multiple unit facility type with staffing values allotted per unit. Only one facility is authorized per airport/location. A unit will be added for each total 1,000 feet of the utility service run, but not for each conductor in the run. See CLM for control line maintenance.

EOF (Emergency Operating Facility) - The location at which headquarters personnel are relocated to perform essential emergency functions. This facility consists of communications, teletype, crypto equipment, and emergency supplies. This is a collocated facility having no environmental staffing.

ERMS (Environmental Remote Monitoring Subsystem) - This facility will perform within the remote maintenance monitoring subsystem (RMMS) as a fully functioning, stand-alone, remote monitoring subsystem (RMS) whose primary purpose is to monitor and control environmental equipment in a wide variety of NAS facilities. This equipment will consist of a microprocessor-based cell controller having four data communications interfaces, sensors, a sensor power supply, and an uninterruptable power supply. The four interfaces include the maintenance processor subsystem (MPS), portable maintenance data terminal (PMDT), sensors, and the remote sensor. This system will provide broad operational functions consisting of the parametric monitoring and control of electrical power systems, environmental conditioning systems, smoke and fire detection systems, and security systems.

ETB (Embedded Threshold Bar). The portion of a light lane consisting of light fixtures installed below ground level, in the pavement, and associated with a runway.

FAC (Fire Department, Crash, and Rescue Equipment) - The equipment represented by this facility type should be point-counted against ATBM or TOWB as appropriate.

FDEP (Flight Data Entry and Printout) - An equipment subsystem providing a direct interface between the air traffic controller and a central computer for remotely entering and receiving flight data information at tower cabs, TRACOs, RAPCOs, or ARTS facilities within the center's control area. The allowance includes the maintenance of all FDEP equipment for each subsystem. This is a collocated facility having no environmental staffing. This facility will be replaced by FDIOC and FDIOR under the FDIO equipment replacement program.

FDIOC (Flight Data Input/Output Center) - A system providing an interface between an air traffic controller and the center computer. The FDIOC provides flight plan data in printed form. This system

replaces FSP computer update (CU)/FSP equipment and FDEP adaptors at centers. Staffing includes the maintenance of printer control units (PCU), en route replacement flight strip printers (RFSP), and central control units (CCU) which control the FDIORs. This is a collocated facility having no environmental staffing.

FDIOR (Flight Data Input/Output Remote) - A system providing direct interface between a remote air traffic control facility and a center. The FDIOR provides for collection and dissemination of flight data in printed form. This equipment will replace FDEP at remote locations; i.e., towers, flight service facilities, etc. Staffing includes the maintenance of the related MODEM, remote control unit (RCU), replacement alphanumeric keyboards (RANK), cathode ray tube (CRT) displays, and terminal RFSPs. This is a collocated facility having no environmental staffing.

FDRS (Flight Data Remoting System) - This system provides flight data to a remote air traffic control facility; i.e., CERAP. The facility includes flight strip printer(s), alphanumeric keyboard(s), and CRT display(s). FDRS replaces the FDEP system between San Juan and Miami. FDIOR normally replaces FDEP. This facility is collocated having no environmental staffing.

FLD (Intermediate Fields and Landing Areas) - A landing area established and operated by the FAA along a designated airway as required to supplement existing airports and to provide areas for emergency use where more than 100 miles in mountainous terrain (200 miles in flat country) exists between lighted airports.

FM (Fan Marker) - A facility in the air navigation system transmitting a 75 MHz radio wave in a fan or bone-shaped radiation pattern and keyed with an identification code or unkeyed with a steady tone. When its signal is received by compatible airborne equipment, visual and audible indications are automatically provided to the pilot advising him that his aircraft is passing over the facility. The FM facilities are not located at ILS facilities nor used for ILS approaches. Staffing values include environmental support.

FOTS (Fiber Optics Transmission System) - A transmission system utilizing fiber optics as a transmission medium and employing programmable controllers at each location to provide monitoring, switching, and fault isolation functions. The FOTS converts the input information (audio, control, data, video, etc.) into the proper form for transmission by way of fiber optics and reconverts the information into the original form at the output destination. Staffing values include environmental workload.

FSAS (Flight Service Automation System) - The FSAS improves pilot access to weather information and NOTAMs, simplifies flight plan filing, and provides a flight service automation system that can handle projected increases in demand for flight services without proportional increases in staff.

FSDPS (Flight Service Data Processing System) - The FSDPS automatically accepts, processes, and stores meteorological data, NOTAMs, flight movements, and planning and control information, and distributes this information to appropriate displays at operating positions and other users via Service A or NADIN. This is a collocated facility having no environmental staffing.

FSS (Flight Service Station) - The FSS encompasses the flight advisory system communications utilized for providing airport and en route advisories, pilot briefings, weather observations, flight plan handling services, point-to-point telecommunications with pilots over international territories or waters, flight plan following, search and rescue action, and other flight assistance operations. This is all the equipment from the controller's headset to and including FAAs demarc. It includes emergency backup transceivers, all

four channel equipment, tone channeling, amplifiers, tie lines, regulators, power supplies and associated jacks, and jack fields needed to send and receive communications from a local or remote communications facility. Maintenance transceivers are captured under the MCT facility alpha. An RCO facility (with suffix Z added to the location identifier) should be established in the FSEP to capture workload for all transmitters, receivers, and teletype equipment located in the equipment room. Environmental staffing workload will be point-counted against ATBM or CTRB as appropriate. This is a core facility with staffing values determined by the number of radio positions. Classes H-P and X-4 are added for facilities formerly classified as an IFSS. Classes Q-4 should also establish an ICSS facility in the FSEP to capture the remaining workload transferred to that facility.

GATR (Ground/Air Transmitter/Receiver) - A communications facility used in conjunction with the military or other organization's operations; e.g., U.S. Customs Service. This is a military equivalent to an RCAG. A transmitter, a receiver, or a linear amplifier counts as one unit. A transceiver counts as two units. This is a collocated facility having no environmental staffing.

GDL (Guidance Light Facility) - A lighting facility in the terminal area navigational system located in the vicinity of an airport consisting of one or more high intensity/low intensity lights to guide a pilot into the takeoff or approach corridors away from populated areas for safety and noise abatement purposes.

GFR (Gap Filler Radar) - A radar facility used to detect and display azimuth and range of en route aircraft operating in airspace not adequately covered by the primary long range radar grid of the NAS. The staffing allowance covers all ancillary equipment systems at the GFR site, including radar, radar beacon, RMLT and/or digitizer, radio communications, etc., as well as environmental support workload. Beyond published operational hours, a GFR is usually accorded delayed restoration response (until the next scheduled shift) in case of malfunction or service interruption.

GOES (Geostationary Operational Environmental Satellite System) - A weather mapping facsimile system for weather/aeronautical information services. This is a collocated facility having no environmental staffing.

GS (Glide Slope) - An ILS navigation facility in the terminal area navigation system providing vertical guidance for aircraft during approach and landing by radiating a directional pattern of ultra high frequency (UHF) radio waves modulated by two signals which, when received with equal intensity, are displayed by compatible airborne equipment as an on-path indication. Staffing values include building/grounds, air conditioning, and other environmental maintenance. Engine generator workload is identified by the power source code.

GUARD (Security Service) - This facility captures the workload for the security service provided to protect the buildings and grounds of a FAA facility such as a center or NY TRACON-type facility. This service is normally contracted out and is a collocated facility which generates no additional staffing for environmental support. The FSEP entry shall contain the percent contract in the appropriate field. This is determined by the percent of total workload actually accomplished by FAA personnel. This is a collocated facility having no environmental staffing.

GWDS (Graphic Weather Display System) - The GWDS is a system comprised of a modular expandable configuration which processes real-time weather transactions to generate and distribute FAA predefined graphic products to flight specialist briefing positions. Each user position contains a color display. An editor position, per facility, will allow modification or enhancements to existing weather graphics products as well as creation of special interest weather graphics for local usage by the flight

specialist. The configuration contains all the essential hardware, software, and communications for weather graphic product access. This system replaces the CCTV facility classes utilized for weather product informational purposes. It is collocated with FSAS Model 1 and Model 1 full capacity equipment in the flight service facility and does not generate environmental staffing. Classes A through F are for flight service type facilities with some compliment of all system components; i.e., editor, printer, etc. Classes G, H, J, and K are for facilities not having all system component representation. This is a collocated facility having no environmental staffing.

HEAT (Central Heating Facility - Per Unit) - A supporting facility containing all equipment necessary to supply heat up to the cutoff for each building in a community. Individual heating equipment within a building is considered part of the building maintenance workload.

HELI (Heliport) - This facility provides staffing values for FAA heliports. These may be gravel, grass, or paved.

HH (Homing Radio Beacon - High Power) See NDB.

IATSC (International Aeronautical Telecommunications Switching Center) - A central operations facility in the flight advisory system, similar to AFSS, providing international point-to-point services but no international air/ground service. Staffing values are based on equipment inventory in accordance with Chapter 4. Staffing values include environmental support.

ICSS (Integrated Communications Switching System) - Provides voice communication functions at towers, TRACONs, and flight service facilities. Type I is for small towers, type II for medium and large towers, and type III is for flight service facilities. A position constitutes all the equipment from the controller's headset to and including the FAA demarc. This is a collocated facility having no environmental staffing. See ATCT and FSS facility alphas for further definition.

IFF (Identification, Friend or Foe) - Data processor facility providing selective mode 4 information transactions, in conjunction with CD and ATCRB facilities, for joint use installations. (This is the GAPA-124.)

IFST (International flight service transmitter station) - A facility in the flight advisory system equipped with radio transmitters used for the transmission of point-to-point and air/ground communications. The flight service facility is the associated control facility. Staffing values are based on equipment inventory in accordance with chapter 4. Staffing values include environmental support. Engine generator workload is identified by power source code.

IM (Inner Marker) - An ILS facility located between the middle marker and the end of the ILS runway, transmitting a 75 MHz fan-shaped radiation pattern modulated at 3000 Hz, keyed at six dots per second, and received by compatible airborne equipment indicating to the pilot, both aurally and visually, that he is directly over the facility on his final approach. Staffing values include environmental support.

IMLSA (Interim Microwave Landing System Azimuth) - Provides lateral guidance on approach path for exact alignment of an aircraft on final approach to the runway. This is a non-Federal facility.

IMLSE (Interim Microwave Landing System Elevation) - Provides vertical guidance on approach path for correct descent of an aircraft on final approach to the runway. This is a non-Federal facility.

ISSS (Initial Sector Suite System) - The ISSS is the key component of the AAS and will provide air traffic controllers with new workstations. This will have significant impact on the job environment and performance requirements of the en route air traffic controller. The ISSS includes the sector suite hardware and software to be provided as part of the full advanced automation system (AAS), the HOST computer system running the NAS Stage A operational program, and the E-DARC system. It will replace the flight input/output capability of the existing computer update equipment (CUE) and flight strip printer (FSP) devices with equivalent capabilities using the data entry and display devices in the sector suites. Capability for displaying radar data will also be provided. The ISSS will serve as an interim system until full AAS implementation. Staffing values are derived from the number of displays, including spares, at the facility location. This is a collocated facility having no environmental staffing.

LABS (Leased A & B Service) - This facility provides a staffing allowance for the analysis, coordination, and problem resolution time for contractor equipment such as the Western Union GS-200 system. This facility replaces the TTY facility.

LCOT (UHF/VHF Link Terminal) - Radio terminal facilities used in lieu of landlines, consisting of all the equipment at one site used for transmission/reception of intelligence and control functions. A single UHF/VHF link terminal is the controlling or controlled end consisting of a radio transmitter or receiver, or both, along with the associated transmit/receive voice or carrier frequency channels. This facility may be replaced by RCLT in the replacement/trunking program. This is a collocated facility having no environmental staffing.

LDA (Localizer Directional AID) incorporated in the LOC facility alpha.

LDIN (Lead-in Light Facility) - A facility in the terminal area navigation system providing directional light guidance to aircraft in approach patterns or landing procedures. Facility configuration consists of a series of flashing lights augmented by steady burning lights, where required, located to visually guide an aircraft through an approach corridor bypassing high density residential, hazardous terrain, commercial, or obstruction areas.

LIVQ (Living Quarters) - This facility classification provides staffing allowances for the maintenance of FAA-owned/leased living quarters used as employee residences. This is a support-type multiple unit facility that includes staffing allowances for maintenance of all appliances and furnishings. Facilities maintained by contract will be included as FSEP entries with the contract responsibility code. Where only a portion of the staffing is obtained by contract, show the percent of workload which is contracted out in the percent contract field. See QS for watchstander quarters and transient quarters.

LLWAS (Low Level Wind Shear Alert System) - This facility provides a low-level wind shear alert warning for use by air traffic controllers in a terminal ATC environment. It consists of a center field sensor and one or more wind shear sensors installed at strategic positions on or adjacent to an airport using telemetering connection to a digital processor with ancillary visual and audible
warning indicators in the central operations facility. Staffing values include environmental support.

LMM (Compass Locator at the ILS Middle Marker) - A radio beacon located at the ILS middle marker site used mainly for ILS approaches. It transmits a continuous carrier L/MF radio wave in an omnidirectional pattern enabling the pilot of an aircraft equipped with an automatic direction finder to determine his bearing relative to the middle marker. All radio beacons located or used as above, regardless of output power, etc., will be treated as compass locators. Staffing values include environmental support for antenna structures.

LNKR (Link Repeater) - A receiver/transmitter facility which relays radio communications between two LCOTs or between intermediate LNKRs in a radio link system using UHF/VHF frequency bands. A site at which two independent two-way radio circuits from different sources are repeated will be counted as two LNKRs (the terminal may or may not be the same). A site at which the UHF/VHF link terminal received intelligence is converted into voice or carrier frequency channels for local utilization and also retransmitted to another location will be counted as two or more (as appropriate) terminal facilities rather than a repeater facility. See LCOT. This system may be replaced by RCLR in the replacement/trunking program. This is a collocated facility having no environmental staffing.

LOC (Localizer) - A terminal facility that provides an approach path for exact alignment of an aircraft on approach to a runway (ILS application) or fulfills special requirements for noise abatement, special air corridors, obstruction avoidance, departure guidance, etc. (LDA application). Staffing values include environmental support maintenance. Engine generator workload is identified by power source code (see Order 6000.5). Distinction between ILS and LDA type LOCs is determined by the facility code contained in Order 1375.4.

LOM (Compass Locator at the ILS Outer Marker) - A radio beacon located at the ILS outer marker site, used primarily for ILS approaches, which transmits a continuous carrier, L/MF radio wave in an omnidirectional pattern, enabling the pilot of an aircraft equipped with a radio direction finder to determine his bearing relative to the outer marker. All radio beacons, regardless of output power, that are located or used as above, will be treated as compass locators. Staffing values include environmental support for antenna structures. Engine generator workload is identified by power source code.

LRNCM (Long Range Navigation C Monitor) - This is a Loran-C monitor facility which is either collocated with a VHF omnidirectional range (VOR) or airport facility. The VOR facility monitors the integrity of the Loran-C transmitter station signals to provide air traffic personnel with system operational status prior to issuing clearance for a Loran-C non-precision instrument approach and provides calibration data for Loran-C approaches. The airport facility operates as a primary chain monitor system (PCMS) which monitors additional parameters beyond those of the VOR facility. The PCMS monitors the entire LORAN chain of facilities to provide status of adequacy for navigational use. Typically, the VOR monitor is FAA owned and maintained while the airport PCMS facilities are USCG owned and FAA maintained.

MALS (Medium-Intensity Approach Lighting System) - An airport lighting facility providing visual guidance to the pilot by radiating medium-intensity focused light beams by which the pilot visually aligns the aircraft with the extended runway centerline.

MALSR (Medium-Intensity ALS (MALS) with Runway Alignment Indicator Lights) - This is a MALS facility with sequence flashers installed from 1,600 to 2,400 feet from the runway threshold. Maximum spacing between lights is 200 feet. The standard facility is landline controlled.

MAPS (Meteorological and Aeronautical Presentation System) - A computerized central control facility in the flight advisory system. It provides automatic data acquisition, processing, storage, retrieval, display, and transmission capability for flight plan handling, flight advisories, weather and aeronautical information consolidation and dissemination, etc., for use by flight service specialists and pilots operating in the NAS. It is a prototype of AFSS and serves peripheral flight service stations. This is a collocated facility having no environmental staffing.

MAREQ (Marine Equipment Boats and Docks) - The MAREQ classification includes the maintenance of docks, boats, etc. Classes A-H are limited to boats powered by engines rated at or above 30 hp. Class

J is for skiffs, jon boats, canoes, and small portable outboard motors (under 30 hp). This allowance includes engine maintenance.

MCC (Maintenance Control Center) - The MCC contains the necessary equipment and other resources which permits maintenance commands, control, and management of NAS facilities by means of status monitoring and control of RMM-capable NAS facilities; provides coordination of the maintenance work force in restoration and maintenance activities; provides sector management with the data and information to effectively manage maintenance resources; and serves as centers for communication and coordination during emergencies (Natural, defense, and accident), flight inspections, etc. Examples of MCC equipment will include the MPS, RMCC, data terminals, printers, etc. This is a collocated facility having no environmental staffing.

MCCP (Maintenance Control Center Processor/Maintenance Monitor Console) - Formerly ESMMC (enhanced systems maintenance monitor console) - The MCCP is composed of multiple workstations supported by backroom processors and a local area network (LAN) which provides the interface capabilities required for a center/ACF facility. In addition, the workstation area has all the communications, radar, and data handling capabilities of the systems maintenance monitor console (SMMC) which it replaces. It provides the interface with systems/equipments, organizations, processes, and personnel within and outside the center/ACF facility for the following functions: (1) coordination for facility restorations and outages, (2) facility outage reporting, (3) PM scheduling and accomplishment reporting, (4) scheduling and recording of facility certifications, (5) coordination of aircraft accident activities, and (6) coordination for flight inspection activities. This is a collocated facility having no environmental staffing.

MCR (Multichannel Recorder) - The MCR records all audio information transmitted or received by the air traffic specialist at an operating position. Staffing values include work associated with the recorders, amplifiers, reproducers, recorder tape changing, etc. This is a multiple unit facility. One unit consists of a recorder, usually with two tape decks. This is a collocated facility having no environmental staffing.

MCT (Maintenance Communications Transceivers) - The MCT captures the workload for VHF transceivers used by maintenance personnel to coordinate activities with air traffic control, flight inspection, and other personnel. It excludes operational transceivers used for emergency backup communications and transceivers used with NRCS. The MCT units are usually mobile types in vehicles or are collocated with other facilities and, therefore, do not generate environmental staffing. Maintenance transceivers located in the radio equipment rooms of ATCT, FSS, etc., facilities are included. Only one facility shall be established per sector or SFO. This is a collocated facility having no environmental staffing.

MDS (Master Demarcation System) - This system is a passive voice-frequency interconnection device that provides a circuit cross-connection capability, circuit monitoring and patch jack appearances, and circuit signal isolation to assist in the identification and isolation of line or equipment failures. It is designed to provide a physical point-of-separation between site customer premise equipment (CPE) and the communication circuits entering and leaving the facility over the service vendors transmission systems and/or radio communications link (RCL) systems. This separation point includes line-side cross-connect frames, circuit routing unit (CRU) interconnection terminations, jackpanel interconnection terminations as required, and drop-side cross-connect frames. This facility is normally restricted to the center environment. See TDS for the mini-demarc application utilized for other locations and facilities. This is a collocated facility having no environmental staffing.

MIG (Military Interface Group) - Data processor facility for processing tube-type ARSR, CD, and IFF data to format required for military regional operations control center (ROCC) needs and ROCC height and other request/control data into tube-type ARSR, CD, and IFF facilities. Converts data to and from military message formats. This facility is physically associated with the CD, but is defined separately due to the specialized function meeting military interface requirements. This facility type will be established at JSS sites only. This is a collocated facility having no environmental staffing.

MIM (Military Interface Modification) - Data processor facility for processing ARSR-3 and IFF data to format required for military ROCC needs and ROCC height and other request/control data into ARSR-3 and IFF facilities. Converts ARSR-3 digital data to and from military message formats. This facility is physically associated with the ARSR-3, but is defined separately due to the specialized function meeting military interface requirements. This facility type will be established at JSS sites only. This is a collocated facility having no environmental staffing.

MLSA (Microwave Landing System Azimuth) - An MLS facility in the terminal area electronic navigation system providing precision horizontal guidance for aircraft during approach and landing by projecting a directional microwave radio beam which is decoded by compatible airborne equipment into aircraft bearing with respect to the runway centerline.

MLSBA (Microwave Landing System Back Azimuth) - Provides guidance for aircraft users during departures and missed approaches. See MLSA.

MLSD (Microwave Landing System Distance Measuring Equipment Precision) - Provides two modes of distance information. The initial approach (IA) mode is exactly the same as conventional DME and uses existing avionic equipment. The final approach (FA) mode provides increased accuracy and is referred to as precision information. See MLSA.

MLSE (Microwave Landing System Elevation) - Provides vertical guidance along a selected approach slope with continuous proportional up-down guidance near the path's center and is sometimes called elevation #1. See MLSA.

MLSF (Microwave Landing System Flare) - This facility provides flare information in Category III landings in the MLS system and is sometimes called elevation #2. See MLSA.

MM (Middle Marker) - An ILS facility located approximately 3,500 feet from the runway threshold on the extended centerline, transmitting a 75 MHz fan-shaped radiation pattern modulated at 1,300 Hz, keyed alternately with dots and dashes, received by compatible airborne equipment indicating to the pilot, both aurally and visually, that he is passing over the facility. Staffing values include environmental support.

MOBIL (Mobile Laboratory) - A mobile facility (van, motor home, trailer, etc.) that normally has built-in equipment, electronic and/or mechanical, to perform its designated function. Examples of this facility would be a test equipment calibration laboratory or a regional frequency van. (A vehicle assigned to haul personnel, spare parts, and small items of test equipment would not be considered a MOBIL.) A MOBIL will not be counted as a VEHS, CBI, or OFFRD.

MODE S (Mode S/Data Link) - A ground-based facility that discretely interrogates each aircraft transponder and processes the aircraft replies for air traffic control purposes. It also provides data link capability. This equipment replaces the ATCRB and ATCBI.

MPS (Maintenance Processing System) - The MPS is comprised of a data processing system designed to monitor and control remote facilities; i.e., 2nd generation VORTAC, etc. This is a collocated facility having no environmental staffing. It is one of the elements of and will normally be located in the MCC facility.

MX (Mobile Engine or Generator Plant) - These mobile engine generators are generally stored at a specific location and are moved to an operating location when required. If located permanently at one location for primary power sources, the mobile engine generator should be classified as a PX.

NADIN (National Airspace Data Interchange Network) - An integrated telecommunications record system which provides centralized switching control and digital data processing as well as network distribution of flight plan, weather, NOTAM, and ATC messages in the NAS. It also provides an interface with international data interchange systems. CTRB captures the environmental workload.

NDB (Non-Directional Beacon) - This facility transmits a continuous carrier radio wave in the low frequency band (190-535khz) in an omnidirectional pattern enabling the pilot of an aircraft equipped with a radio direction finder to determine his bearing relative to the facility. This facility is sometimes called a homer or homing beacon. This facility type includes MH facilities which have less than 50 watts and HH facilities which have in excess of 2,000 watts outputs. NDB facilities are not located at an ILS marker site nor are they used mainly for ILS approaches. Staffing values include environmental support. This facility replaces the H and HH facility contractions.

NMCE (Network Monitor Control Equipment) - The NMCE is a processor based switching system for remote testing and alternate route capability for all circuits provided by the FAA utility using RCL, leased vendors, or both. Staffing values include time spent for internal/external coordination, troubleshooting, and line performance monitoring activities.

NRCS (National Radio Communications System) - This system provides communications support for national, regional, and local activities. The HF/UHF/VHF radios are deployed in base, mobile, and repeater stations. An associated unit is a single handheld transceiver or a mobile transceiver with or without linear amplifiers.

NEXRAD (Next Generation Weather Radar) - Doppler-processing radar devoted strictly to weather tracking and identifying storm systems. Staffing values are for the radar site equipment only. The remote/indicator site staffing is captured under the PUP facility alpha. Staffing values include environmental support.

OARTS (Oceanic Air Route Tracking System) - A subsystem adjunct to an automated center for processing flight plan updates and displaying the position of aircraft in transit on transoceanic flights. The staffing values include all the hardware and software maintenance functions prerequisite to OARTS operational support in the en route air traffic control environment. This is a collocated facility having no environmental staffing.

OAW (Off Airways Weather Station) - An NWS facility where off-airways weather data is collected, analyzed, and disseminated via FAA data interchange facilities in the national flight advisory system. The communications equipment is normally owned and maintained by the FAA. The weather service normally maintains the weather equipment but may be FAA maintained by regional agreement. This is a collocated facility having no environmental staffing.

ODALS (Omnidirectional Airport Lighting System) - An airport lighting system which provides omnidirectional orientation by visual vectoring with remote control of light intensity from cockpit and the tower/flight service facility. The standard facility utilizes landline control.

ODAPS (Oceanic Display and Planning System) - Provides automated flight data and conflict probe to allow effective assignment of routes and altitudes. Includes a display and a stand-alone processor. This is a collocated facility having no environmental staffing.

OFDPS (Offshore Flight Data Processing System) - The OFDPS is a processor subsystem which handles the flight data processing routine at EARTS facilities. It is incorporated into the EARTS facility for this purpose. A system is considered to be the total configuration at the locations identified in the classes below. Staffing values include the total workload for the system configuration; i.e., main and standby, single equipment, training facility, etc. Only one facility per location is to be established in the FSEP unless additional discrete service is provided to a satellite or other facility via another system configuration. This is a collocated facility having no environmental staffing.

OFFRD (Heavy Equipment and Off-Road Vehicles) - This includes, but is not limited to: graders, forklifts, tractors, snow cat, snowmobile, snow-removal equipment, rock crushers, asphalt plants, and heavy mobile equipment not normally requiring a license for highway travel (except MX equipment). This is a multiple unit facility, and staffing values are per unit.

OLD (General Oil Distribution System) - This classification provides staffing values for FAA-maintained bulk storage and fuel distribution systems used as a centrally controlled source for transporting fuel to other facility locations. The values cover maintenance of all pumps, pipelines, bulk storage tanks, valves, controls, etc., where commercial service is not available. A fuel storage tank, with or without a pump, for one building (except PX) does not qualify for entry as OLD in the FSEP. OLD maintained by contract should have a contract responsibility code.

OM (Outer Marker) - An ILS facility located 4 to 7 miles from the runway threshold on the extended centerline, transmitting a 75 MHz fan-shaped radiation pattern modulated at 400 Hz, keyed at two dashes per second, and received by compatible airborne equipment indicating to the pilot, both aurally and visually, that he is passing over the facility and can begin his final approach. Staffing values include environmental support.

PAM (Peripheral Adapter Module) - This facility comprises the units which were incorporated into the 9020A & D systems which were not scheduled for replacement with the HOST. This facility is to be established in the FSEP following HOST installation. This is a collocated facility having no environmental staffing.

PAMRI (Peripheral Adapter Module Replacement Item) - The PAMRI will replace the data input/output capability of the existing PAM and DRG interface equipment with more reliable equipment having enhanced capabilities. It will consist of commercially available hardware and software. The existing HOST software shall be modified to accommodate the PAMRI. The PAMRI will be fully compatible with the ISSS. It will provide the interface between the processor of the HOST and the many peripherals such as radar, looped sim interfaces, etc. All PAMRIs will be identical, varying only in quantities of adapter type interfaces installed and in software adaptation to the operational configuration of the individual facilities. This is a collocated facility having no environmental staffing.

PAPI (Precision Approach Path Indicator) - A simple visual aid to assist pilots during their approach to landing. It enables pilots to acquire the correct glide slope and subsequently to maintain their position on it, thus ensuring an accurate approach and landing. The PAPI system consists of four sharp transition projector units located at the side of the runway, spaced laterally at 29.5-foot intervals. A second complementary set is normally provided on the opposite side of the runway. The setting angles of the red/white interfaces of the four units are graded; the differences in angle between the units being typically 20 minutes of arc. The nominal glide slope is midway between the angular settings of the center pair of units and the on-glide-slope signal and is thus two red and two white lights in the bar. If the aircraft goes below the glide slope, the pilot will see a progressively increasing number of red lights. Conversely, if the aircraft goes above the glide slope, the number of white lights seen is increased.

PAR (Precision Approach Radar) - A radar facility in the terminal area navigational system used to detect and display, with a high degree of accuracy, azimuth, range, and elevation of aircraft on the final approach to a runway enabling the air traffic control specialist to provide advisory service to the pilot. Staffing values include environmental support.

PCS (Power Conditioning System) - The PCS equipment is a stand-alone system provided at high priority facilities to ensure conditioned and continuous alternating current (AC) electrical power to critical loads. The PCS system is designed to operate from either commercial or standby engine generator AC sources. It provides conditioned AC power to critical loads at all times, including AC power source transfers. The PCS includes internal or external batteries whose direct current (DC) output is converted to AC power. A module consists of a rectifier, batteries, inverter, and associated controls. This facility includes the systems formerly known as UPS. A PCS facility should be established for each complete system meeting the criteria contained in this definition.

PDC (Pre-Departure Clearance System) - A system located in the air traffic control tower (ATCT) that is used to transmit departure clearances to aircraft, using digital data communications. PDC is comprised of a rack of computer and communications equipment located in a tower equipment room and a terminal in the tower cab for controller interaction. Flight plan data is entered into the PDC system through a passive tap on the flight data input/output (FDIO) remote control unit.

PRM (Precision Runway Monitor) - This facility is a secondary radar type system, similar to the MODES, which operates and updates targets at a faster rate than that of the normal ATCRB or MODES type systems (approximately twice as fast). This faster rate of update allows for improved accuracy in predicting target locations thus effecting quicker responses from both the controller and pilot. This system will be utilized to increase the efficiency of operations at parallel runway configured locations, reducing the instrument flight rules (IFR) runway separation minimums below the current 4,300 ft, for simultaneous IFR approaches. This a collocated facility having no environmental staffing.

PUP (Principal User Processor) - This facility receives the NEXRAD data products and provides the request, display, storage, annotation, and distribution of products by operational personnel. It contains the dedicated hardware and software required for graphics processing, local control, status monitoring, local annotation, and product achieving. System equipment includes the system console and primary workstation composed of two high resolution color graphics monitors, mouse, dedicated color reproducing hard copy device, and an applications terminal for keyboard entry. This is a collocated facility having no environmental workload. Staffing values are for PUP only.

PX (Primary Power Engine or Generator Plant) - Primary power plant is the main source of power and is normally the power plant for the community. Where a movable, portable, or mobile plant is installed permanently, it is treated as a primary power plant.

QS (Quarters Building - other than LIVQ) - A QS building is that type normally used by watchstanding personnel for on-site standby quarters or for emergency use when required (includes transient quarters). To qualify, the facility must have kitchen (with range, refrigerator, and sink), bathroom, and sleeping areas. Sleeping and eating facilities in a shop or storeroom do not qualify (Nor do ARSR facilities). Family-occupied living quarters are not to be reported under this facility type - (see LIVQ).

RAPCO (Radar Approach Control - Air Force) - An air traffic control facility using radar equipment in conjunction with air/ground communications, ASR, ATCRB, and control and display equipment. This is a point-count facility. Where collocated with ARTS, communications and other equipment not included in ARTS will be point-counted against RAPCO. Environmental staffing values are counted against ATBM.

RBC (Rotating Beam Ceilometer) - This is a weather observation facility measuring the height above ground level of the lower layer of clouds or obscuring phenomenon at a point along the approach path to an ILS runway. Facility configuration includes the rotating beam transmitter, receiver unit, and indicator. Staffing values include environmental support.

RBDE (Radar Bright Display Equipment) - Provides CRT display of radar data allowing viewing under bright light or high ambient lighting conditions (945 line systems, type 3, 4, 5, and 6 systems). Total configuration includes workload for control and patch panel, beacon decoder, control rack assembly, mappers, scan converters, displays, and control equipment. The RBDE system includes all the radar equipment installed from the RMLT termination panel for one en route surveillance radar and/or control-end equipment. This is a collocated facility having no environmental staffing.

RBDPE (Radar Beacon Data Processor Equipment) - This type facility provides TPX-42 radar beacon data processing with direct altitude and identity coded signals for display in a terminal ATC environment. The class structure is determined by the number of displays. Staffing values include maintenance of video mappers, control panels, other associated ASR indicator site equipment, etc. Facilities with BRITE type displays only should claim these under the BRITE facility and assign Class C for the RBDPE facility. This is a separate facility system and should not be point-counted against TRACO, RAPCO, RATCF, ARTS, or BRITE. This is a collocated facility having no environmental staffing. See ATCT, TRACO, or RAPCO for communications.

RBPM (Remote Beacon Performance Monitor) - This is a transponder, remote system monitor (RSM) that receives interrogations from, and transmits replies to, the ATCBI and/or ATCRB for monitoring purposes. (This type facility has been referred to as a "parrot in a tree.") See ATCBI and ATCRB for ISM locations. Staffing values include environmental workload, if stand-alone class A. Whereas, class B does not include environmental staffing, collocated.

RCAG (Remote Center Air/Ground Communications Facility) - This is a remote air/ground communications facility having transmitters and/or receivers and ancillary equipment serving a center. One channel of center air/ground communications equipment employs one control line and associated equipment needed to modulate, shift to standby equipment, or shut down the channel and associated RF transmitters and receivers. A split channel is one in which separate control lines and associated equipment are used for each frequency. Each split portion becomes one channel. Where two centers are served, two

RCAGs will be entered in the FSEP. An RCAG collocated with a center will be treated as a separate facility and not as part of the center (add suffix Z to the location identifier of the collocated RCAG). Solid-state model codes shall be used when more than 50 percent solid-state transmitters/receivers are installed. Environmental staffing values are included for classes A-H (stand-alone), but not for classes J-R (collocated). Engine generator staffing values are determined by the power source code (see Order 6000.5). Emergency backup transceivers are captured under the BUEC facility alpha. Maintenance transceivers are captured under the MCT facility alpha.

RCIU (Remote Control Interface Unit) - Remote control equipment which allows centers to monitor, control, and reset remotely ARSR (ARSR 1, 2, and FPS series), CD, and ATCRB facilities as well as supporting environmental equipment. This is a collocated facility having no environmental staffing.

RCLR (Radio Communications Link Repeater) - Repeater link equipment designed to be used with radio communications link terminal equipment relays and any number of frequency diversity multiplex channels. It may be part of the National Interfacility Network serving area control facilities, terminal control facilities, or automated flight service stations and be connected to any number of other FAA facilities. This system replaces RMLR in the replacement/trunking program and may also replace those facilities formerly designated as LNKR. See RCLT for terminal type facilities for this link-type system. Environmental staffing values are included for classes A, B, and C only. Engine generator staffing values are determined by the power source code.

RCLT (Radio Communications Link Terminal) - Terminal link equipment designed for any number of frequency diversity multiplexing channels. This facility can be used in lieu of lines for transmission of video information, analog voice data, radar broadband and/or digital data, etc. It may be part of the National Interfacility Network serving area control facilities, terminal control facilities, or automated flight service stations, and may be connected to any number of other FAA facilities. This system replaces RMLT in the replacement/trunking program and may also replace those facilities formerly designated as LCOT and CMLT. See RCLR for repeater type facilities for this link-type system. This is a collocated facility having no environmental staffing.

RCO (Remote Communications Outlet) - A remote or peripheral facility providing radio communication services between flight advisory specialists at flight service facilities and aircraft pilots. If the equipment installed in one building serves both flight service facilities and a primary ATC central operations facility, there should be an entry in the FSEP for each type operation served; i.e., RTR, RCAG, or BUEC and RCO. See definition for RTR, BUEC, and RCAG. A transmitter, a receiver, or a linear amplifier each count one unit. An RCO, with suffix Z added to its location identifier, should be established for radio communications equipment; i.e., transmitters, receivers, etc., located in the flight service facility equipment room. Emergency backup transceivers are excluded and are captured under the FSS or BUEC facilities. Maintenance transceivers are captured under the MCT facility. EOFs will be listed as EOF and not as RCO. Staffing values include environmental support when it is a stand-alone or primary facility only (Classes A through K and O). RCOs when collocated, and not the primary facility, will not capture the environmental workload.

REIL (Runway End Identification Lights) - An airport lighting facility in the terminal area navigation system consisting of one flashing white high intensity light installed at each approach end corner of a runway and directed towards the approach zone, which enables the pilot to identify the threshold of a usable runway.

RID (Runway Incursion Device) - An electronic device utilized for preventing runway incursions. A set of four electronic reminders with two modes of operation are utilized. One mode is the lamps only where the large red lamps flash at 1/2 second intervals. The other mode provides both lamps and voice indications. This system is connected into the radio communications frequencies for monitoring runway commands given by the controller each time the frequency is keyed. Two configurations are possible: (1) main unit only or (2) main unit with a slave unit. This system is found in the ATCT facilities. This is a collocated facility having no environmental staffing.

RMCC (Remote Monitor Control Center) - This facility is the VORTAC remote monitor and control equipment consisting of two input/output terminals (IOT) and two teletypewriters (TTY) and associated electronic equipments. It communicates with the VORTAC facility control processor unit (FCPU) via one of 16 RMCFs to complete all human interface functions remotely. It is collocated having no environmental staffing.

RMCF (Remote Monitor Control Facility) - An RMCF monitors and controls the 2nd Generation VOR/DME/TACR equipment. It consists of a display, keyboard, printer, and associated electronic equipment. This is a collocated facility having no environmental staffing. A separate facility shall be entered for each RMCF capable of monitoring and controlling eight VOR/DME/TACR facilities.

RMLR (Radar Microwave Link Repeater) - A facility in the microwave link system which relays broadband/narrowband radar and voice/data communications. This system will be replaced by RCLR in the replacement/trunking program. At RMLRs with PCS equipment a PCS will be established as a separate facility. Staffing values are based on RMLR equipment models (RML-1, 2, 3, 4, 5, 6, FRQ-11, etc.) and include environmental credit based on the classes below. Engine or generator staffing is identified by power source code.

RMLT (Radar Microwave Link Terminal) - A terminal microwave facility transmitting broadband/narrow band radar and voice/data communications. Two RMLTs are used with each RML system. Staffing values include credit for the dish, tower, and passive reflector normally associated with an RMLT site even if the tower and reflector are remotely located. This system will be replaced by RCLT in the replacement/trunking program. Staffing is based on RMLT equipment models (RML-1, 2, 3, 4, 5, 6, FRQ-11, etc.) according to the classes below. In the class structure, the term SUPERGROUP refers to a subcarrier frequency generation chain capable of providing up to 60 discrete channels. Addition of the VDM allows transmission of narrowband radar and other data. This is a collocated facility having no environmental staffing.

RMSC (Remote Monitoring Subsystem Concentrator) - The RMSC is a unit comprised of a microprocessor, RF link, power supply, and associated electronics which receives data inputs from each RMS facility connected to it and combines the data inputs into a composite data response for transfer to the MPS (Next level processor). The RMSC transfers workload to the MPS. This is a collocated facility having no environmental staffing.

RRH (Remote Readout Hygrothermometer) - The hygrothermometer is an instrument system designed for indicating or recording dew point and air temperatures through the use of remote readout thermometers. The major assemblies consist of a thermal shield (located in the field) and dew point/air temperature indicators (located in a weather observatory). Staffing values include environmental workload.

RRWDI (Radar Remote Weather Display Indicator) - This equipment processes and displays real-time weather information from selected FAA and NWS radar sites (see RRWDS). This equipment was

previously point-counted at central operations facilities. For facility classing purposes each processor is a unit and each display is a unit. This is a collocated facility having no environmental staffing.

RRWDS (Radar Remote Weather Display System) - This equipment, located at selected FAA and NWS radars, provides real-time weather information to FAA and weather service facilities. It is to be added to the FSEP as a separate facility at radar sites. Equipment located at the center or flight service facility will be added as a separate RRWDI. This is a collocated facility having no environmental staffing.

RTCCS (Remote Tower Communications Control System) - A system that provides BRITE/BANS control and entry capability between a tower and ARTS/EARTS computer. This is a collocated facility having no environmental staffing.

RTR (Remote Transmitter/Receiver) - A facility providing radio communication services between air traffic controllers at terminal facilities and aircraft pilots. If the equipment installed in one building serves more than one terminal communications facility at that airport location, only one RTR shall be entered in the FSEP; if one is off the airport, then two RTR facilities should be shown in the FSEP; if equipment is collocated that serves a flight service facility, an RCO should also be listed in the FSEP; or if equipment is collocated which serves a center, an RCAG should also be shown on the FSEP. A transmitter, a receiver, or a linear amplifier each count one unit. An RTR facility, with suffix Z added to the location identifier, should be established in the FSEP to capture all transmitters, receivers, etc., installed in the tower equipment room. Emergency backup transceivers are excluded and are captured under the ATCT facility. Maintenance transceivers are captured under the MCT facility. Staffing values include environmental workload when it is a stand-alone or primary facility (Classes A through N, P, X, and O). When collocated and not the primary facility, the primary facility will capture the environmental workload (Classes Q through 7). Engine generator workload is identified by power source code.

RVR (Runway Visual Range) - This system derives the runway visual range value. The system consists basically of a light beam projector and a receiver located at a measured distance from the projector. Variation in light beam intensity, runway edge light setting, and ambient light conditions are converted to visibility values and telemetered to the terminal central operations facility for use by ATC personnel controlling traffic. Staffing values include environmental support.

SACOM (Satellite Communications Network) - This facility represents the national satellite communications network setup for the Administrator or other applications such as the Alaskan NAS interfacility communications system (ANICS). This is a collocated facility having no environmental workload.

SAL (Shop or Laboratory) - This facility accounts for the time associated with the calibration of critical test equipment whether in-house or contractually accomplished. Class is determined by the number of items of test equipment calibrated per year. Only one facility is authorized per cost center. This is a collocated facility having no environmental staffing.

SALS (Shortened Approach Light System) - An airport lighting facility in the terminal area navigation system providing visual guidance to the pilot by radiating high intensity (15,000 candle power (CP)) focused light beams by which the pilot visually aligns the aircraft with the extended centerline of the runway. The lighting facility is 1,500 feet in length with light bars spaced 100 feet apart or one-half standard ALS spacing.

SAN (Sanitation System) - This facility provides staffing values for FAA- maintained community-type sanitation systems (trash dumps meeting EPA standards; i.e., burned or covered) at isolated FAA stations which handle waste disposal other than sewage (see SWG). Staffing values include the disposal of waste from community living quarters (LIVQ) and other FAA buildings.

SB (Storage Building) - A separate building used to house material and equipment similar to a garage or warehouse. Typical applications for this facility definition include AF storage for F&E staging areas, FMP/SMP materials storage, etc. AF sector/FMP employees provide the janitorial and building maintenance. A structure associated with a standard defined facility (ASR, ARSR, GS, LOC, VOR, ALS, MALSR, etc.) is excluded. Buildings less than 100 square feet do not count.

SCC (Systems Command Center) - This ATC central operations facility is the systems command center which integrates the functions of the central flow control facility (CFCF), the central altitude reservation facility (CARF), the ATS contingency command post (ATSCCP), the airport reservation office (ARO), and other associated functions required to ensure the safety and effectiveness of air traffic in the NAS. It is located at FAA headquarters. Maintenance staffing allowance is based on workload. This is a collocated facility having no environmental staffing.

SCIP (Surveillance and Communications Interface Processor) - A firmware programmable processor which provides the interfaces between the local and remote sites, the ARTS computer, indicator site displays, and the beacon processing equipment. This facility is associated with the ASR-9 system. Local and remote applications will be utilized. The local SCIP processes the weather, radar target and channel data for transmission to the remote site. It also supplies the necessary data for driving the local maintenance plan position indicator (PPI). The remote SCIP processes data similarly at the indicator site, but can drive up to 8 PPIs. A second remote SCIP can be added, the dual remote SCIP, for supplying another remote site with the same radar data. The remote unit also provides remote control of the radar system. The local SCIP workload is captured by the ASR facility alpha. This is a collocated facility having no allowance for environmental workload. The staffing allowance is for the SCIP only; PPIs, beacon equipment, etc. are captured by other appropriate facility alphas (TRACO, ARTS, etc.).

SMUX (Statistical Multiplexer) - This facility combines multiple low-speed asynchronous channels (each of which is typically transmitting data only a fraction of the time) into a synchronous channel whose speed may be significantly lower than the sum of the asynchronous channel speeds. Short term buffering and dynamic bandwidth allocation make this possible. The STATMUX network supports the CBI, TMS, and MMS operational requirements. This is a collocated facility having no allowance for environmental workload.

SPS (Systems Performance Specialty) - The SPS is the technical and administrative management of hardware and software/firmware packages and programs associated with automation and computer systems at the sector and SFO levels; e.g., ARTS, HOST, NAPRS, MMS, RMMS, etc. This is not a multiple unit facility and the staffing values reflect workload by class. This is a collocated facility having no environmental staffing.

SRAP (Sensor, Receiver, and Processor) - A facility where primary and secondary radar data are acquired, correlated, merged, and then sent to a data processing system. This is a collocated facility having no environmental staffing.

SSALR (Simplified Short Approach Lighting System with Runway Alignment Indicator Lights) - This is a SSALS facility with sequence flashers installed from 1,600 to 2,400 feet from the runway threshold. Normal spacing between lights is 200 feet. Class A, standard facility, is landline controlled.

SSALS (Simplified Short Approach Lighting System) - An airport lighting facility in the terminal area navigation system consisting of seven light bars, spaced at 200-foot intervals extending on the runway centerline out to 1,400 feet from the runway threshold. This is a simplified version of the standard ALS. The Class B facility includes three sequenced flashers, flashing in rapid sequence towards the runway threshold, and a crossbar at the 1,000-foot station.

SSCD (Sector Suite Computer Display) - incorporated in the ISSS facility alpha.

SSO (Self-Sustained Outlet) - A self-powered radio repeated facility functioning as one unit in a chain of similar facilities delivering air/ground communications service to aircraft. Each facility, ordinarily located in an isolated area lacking roads or power, has its own thermoelectric generator and insulated heater designed to assure several months of unattended radio operation. The facility may be arranged as a two-way repeater with or without an air/ground outlet or as a terminal with an air/ground outlet. Staffing values include environmental workload.

SWG (Sewerage System) - This facility classification provides a staffing allowance for FAA-maintained community-type sewerage systems where public or commercial service is unavailable. Staffing values include the workload for the maintenance and upkeep of the laterals from a point 5 feet from the building to, and including, the main distribution lines, disposal plant, and filtering beds. Staffing values include the entire sewerage system serving one building with multiple living units or one system serving more than one building.
NOTE: Allowance for septic tanks, single building leach fields, such as those for ARSRs, flight service facilities, VORTACs, towers, single dwelling units, or a combination thereof, are included in associated facility environmental staffing values and shall not be listed as SWG.

TAAS (Terminal Advanced Automation System) - The TAAS project is the third step of the AAS program. The TAAS segment of implementation is the initial ACCC step that will replace terminal radar functions in the ACCC environment. The TAAS allows the use of AAS ISSS equipment by terminal area controllers, and replaces the existing ARTS equipment in advance of availability of the full AAS configuration. TAAS is collocated with the ISSS and allows the possibility of consolidating multiple approach/departure controls into a single facility. In addition, the early deployment of the sector suite equipment for terminal control provides an improved terminal controller-system interface. Each TAAS interfaces with one or more TCCCs, and each TAAS will interface with one or more digital BRITEs. Implementation of this project is preparatory to future facility consolidation efforts.

TACAN (Tactical Air Navigation) - UHF transponder facility in the en route or terminal navigation system which transmits a pulse train providing distance and azimuth information to an aircraft relative to facility location. This facility is not collocated with a VOR. If this facility is commissioned with distance- only service function, it is entered in the FSEP as a DMER. Staffing includes environmental workload.

TACR (Tactical Air Navigation) - UHF transponder facility in the en route navigation system which transmits a pulse train providing distance and azimuth information to an aircraft relative to facility location. This facility is collocated with a VOR having no environmental staffing.

TCCC (Tower Control Computer Complex) - The TCCC introduces automation into the tower's physical and operational environment and provides completely new functions. All flight information will be displayed to controllers on computerized screens, eliminating the manual handling of paper flight strips and minimizing the need for verbal communications among tower controllers. The TCCC is an automated tracking system utilized in the terminal air traffic control system that provides automation support for the control of aircraft in a volume of airspace, including the airport surface, under the air traffic jurisdiction of a tower or TRACON facility. This facility is the terminal element of the AAS. This is a collocated facility having no environmental staffing.

Installation of TCCCs in selected ATCTs will be implemented coincidentally with the TAAS. TCCC is comprised of automation equipment and software for the control of aircraft in the airspace under the control jurisdiction of an ATCT and on the airport surface. TCCC will interface with the ACCC in the en route facility for the exchange of surveillance, flight data, and local environmental and airport system status information. The TCCC system will support the transition of the NAS to the ACF concept.

TCDD (Tower Cab Digital Display) - A facility which provides a computer generated representation of the air traffic situation in the terminal area. The TCDD, which may interface with an ARTS data processing system, is provided with operator-controlled display selection and data entry capabilities. This is a collocated facility having no environmental staffing.

TCS (Tower Communications System) - A system which controls voice ground-to-ground communications within the facility (intercom), between facilities (interphone), and ground-to-air communications (radio) between air traffic controllers and pilots in the terminal environment. This is a collocated facility having no environmental staffing. See ATCT for further definition or clarification.

TDDS (Terminal Data Display System) - A system that accepts, processes, distributes, and displays general purpose video information in a control facility. This system utilizes a dedicated computer, data input terminal, and display monitors. Staffing is determined by the number of units (each display counts as a unit). This is a collocated facility having no environmental staffing.

TDS (Telecommunications Demarcation System) - This facility is the standardized demarcation point for isolation of vendor and Government equipment at terminal facilities. This facility is an adjunct to the MDS facility at the centers (commonly known as the mini-demarc). It allows faster problem isolation, flexibility in configurations, and facilitates cutover of recompeted circuits. This is a collocated facility having no allowance for environmental workload.

TDWR (Terminal Doppler Weather Radar) - A radar utilized for the detection of hazardous weather conditions such as wind shear, microbursts and gust fronts, winds, precipitation, thunderstorms, and turbulence at an airport. This information is provided to air traffic on displays at terminal facilities, and will be used to provide alerts of hazardous weather conditions in the terminal area and to provide advanced notice of changing wind conditions to permit timely change of runways being used for take-offs and landings.

TELEX (Telephone Exchange) - The TELEX system includes the telephone exchange and associated terminating equipment, building and grounds, interconnecting lines and cables (including those assigned to control specialized voice circuit usage), TELRAD, EXITONE, EAGLE, EXECUTONE, switches, etc., and all standard telephone instruments owned or leased by the FAA; i.e., telephones, PBX, handsets, etc. Specialized terminating equipment such as call commander or 102 systems are chargeable to the facility in which they are installed. This is a collocated facility having no environmental staffing.

TIM ([TELCO] Interface Maintenance) - This facility accounts for the time associated with the coordination and assistance provided in the maintenance of telephone lines. It includes the time spent in performing TELCO line runs, problem notification to TELCO, awaiting TELCO arrival, and other coordination with TELCO. This facility shall only be established at central operations facilities; e.g., centers, flight service facilities, towers, etc. Telephone line maintenance on other facilities is included in the facility allowance. This is a collocated facility having no environmental staffing.

TIPS (Terminal Information Processing System) - This system accepts, processes, distributes, and displays flight and other nonradar data for an entire terminal area. It is used by ATC personnel in conjunction with tower, TRACO, and ARTS facility control operations. This is a point-count facility with the AF staffing values being based on equipment inventory in accordance with chapter 4. This is a collocated facility having no environmental staffing.

TMCC (Traffic Management Computer Complex) - A computer system remotely connected to the air traffic control command center (ATCCC) located at FAA headquarters. This is a collocated facility having no environmental staffing. This facility replaces CFCC.

TMLI (Television Microwave Link Indicator) - The receiving end of a TV microwave link system used to receive radar, beacon, and video map data in TV format at satellite towers or a center. Staffing values include the receiver and antenna but not the BRITE displays, which shall be captured in a separate FSEP entry for the BRITE facility. This is a collocated facility having no environmental staffing.

TMLR (Television Microwave Link Repeater) - A repeater used at an intermediate point in a TV microwave link system described under TMLI. Staffing values include one transmitter, one receiver, two antennas, structural support, and ancillary interface equipment. Staffing values include environmental workload.

TMLT (Television Microwave Link Transmitter) - The transmit end of a TV microwave link system described under TMLI. Staffing values do not include ancillary equipment such as BRITE. This is a collocated facility having no environmental staffing.

TMU (Traffic Management Unit) - This system performs local flow management functions at the center/ACFs, Washington headquarters, and selected terminal facilities and is comprised of automated workstations, computer entry/readout devices, communications, FSPs, PVDs or aircraft situation displays (ASDs), and the associated satellite transmission equipment. This is a collocated facility having no environmental staffing.

TOWB (Tower Building) - This facility provides for the tower and attached base building and related ground maintenance requirements including all the air-conditioning, heating, water, building, and electrical service and associated engine or generator control equipment. See table 6 of appendix 2 for equipment point-count values. Point-count items from all other tables are excluded. Engine generator staffing is identified by power source code (see Order 6000.5). If not fully maintained by the FAA, the percent contract field in the FSEP should reflect the portion which is accomplished by FAA.

TR (Trails and Roads) - This facility provides staffing values for FAA access roads used for vehicular travel. Normal roads of less than 1/2 mile, used for access to most facilities, should not be entered in the FSEP as a TR but are included in the primary facility served; i.e., environmental. This is a support-type facility in the multiple unit category as described in paragraph 24i(2), with staffing allocated per mile,

rounding off fractions to the nearest whole number; i.e., 0.5 to 1.49 miles = 1 unit; 1.5 to 2.49 miles = 2 units, etc.

TRACO (Terminal Radar Approach Control) - This facility type identifies locations where the ARTS and the IFR room are not located in or adjacent to the tower base building and/or facilities without ARTS or RBDPE regardless of IFR room location. This facility will only be authorized under these conditions. An RTR with suffix Z in the location identifier will be established to capture the workload for all transmitters, receivers, etc., that are located in the equipment room. Emergency backup transceivers will be captured under this facility. Maintenance transceivers will be captured under the MCT facility alpha. All other electronic equipment, not identified as another facility type, will be point-counted against TRACO for class determination. Environmental staffing values will be point-counted against ATBM or TOWB dependent upon configuration and location relative to the tower base building. Engine generator staffing values will be identified by power source code.

TTY (Teletype) - See LABS.

TVSR (Terminal Voice Switch Replacement) - The Terminal Voice Switch Replacement (TVSR) project, formerly the Tower Communications System (TCS) project, will provide modern voice communications switching and control systems for ATCTs and TRACONs. TVSR is composed of the Integrated Communications Switching Systems (150 Phase 1B equipment systems) for large towers, and the Small Tower Voice Switch (100 systems) for small towers.

TWEB (Transcribed Weather Broadcast) - This system records weather information for different areas of a flight advisory service and automatically sequences it in audio form via telephone lines to a VOR, LOM, or NDB facility to be transmitted. The hazardous in-flight weather advisory service (HIWAS) is a function added to TWEB and is identified by a class of this facility, in lieu of a separate facility identification code. This is a collocated facility having no environmental staffing.

UB (Utility Building) - A building used to house a laundry, restaurant, recreation facility, hangar, FMP shop, environmental equipment repair shop with associated shop equipment, electrical distribution equipment, engine generator, and stationary equipment. Structures and shop areas associated with a standard defined facility (ALS, ASR, ARSR, GS, LOC, MALSR, VOR, HEAT, and WSM) are excluded. Fiberglass, equipment trailers, prefabs, and buildings less than 100 square feet are also excluded.

VASI (Visual Approach Slope Indicator) - An airport lighting facility in the terminal area navigation system used primarily under VFR conditions, providing vertical guidance to aircraft during approach and landing by radiating a directional pattern of high intensity red and white focused light beams that indicate to the pilot that he is "on path" if he sees red/white, "above path" if white/white, and "below path" if red/red. Lamp brightness is changed to preset levels by the operator on manual systems and by the system itself on automatic systems.

VEHS (Vehicle Maintenance) - This facility provides staffing values (per unit) for the maintenance of motor vehicles used for transporting personnel, equipment, and supplies. ATRAM, FAC, MAREQ, MX, and OFFRD equipment are excluded from this classification.

VOR (VHF Omnidirectional Range) - A facility radiating a VHF radio wave modulated by two signals whose relative phases are compared, resolved, and displayed by a compatible airborne receiver to give the pilot a direct indication of bearing relative to the facility. Staffing values include environmental support workload. Engine generator workload is identified by the power source code.

VOT (VHF Omnidirectional Range Test) - This facility radiates a signal modulated by two frequencies with relative phases that are constant which provide a fixed azimuth indication to aircraft for VOR equipment calibration and verification. The VOT may be either collocated or a stand-alone facility. Environmental staffing is included in the stand-alone facility. When collocated it will be captured by the primary facility.

VSCS (Voice Switching and Control System) - The VSCS will provide a voice communications system which performs the intercom, interphone, and air-ground voice connectivity and control functions necessary for air traffic control operations in ARTCCs and area control facilities. The VSCS is a system which will control voice ground-to-ground communications within the facility (intercom), between facilities (interphone), and ground-to-air communications (radio) between air traffic controllers and pilots at a center/ACF facility. This is a collocated facility having no environmental staffing.

WMSC (Weather Message Switching Center) - A facility in the flight advisory system that automatically provides for low-speed collection, storage, and dissemination of weather data between circuits. The WMSC is collocated with the IATSC at Kansas City and generates no environmental staffing.

WMSCR (Weather Message Switching Center Replacement) - A facility which performs functions related to the collection, storage, and dissemination of alphanumeric and graphic weather data. It also collects NOTAM data from the flight service facility environment for processing by the consolidated NOTAM system processor (CNSP). The CNSP returns the processed NOTAM data to the WMSCR for storage and distribution. WMSCR telecommunications are primarily performed by the NADIN packet switching network (PSN). The WMSCR system consists of two identical nodes (switching centers), each of which, under normal conditions, support half of the system, but is capable of meeting all functional requirements of the entire system upon failure of the other node. A NWS telecommunications gateway (NWSTG)/WMSCR interface device (NWID) is located at the Washington ARTCC and serves as the interface between the WMSCR and the NWS. The WMSCR is a collocated facility having no environmental staffing. This is the replacement facility for the WMSC.

WSM (Water System Maintenance) - This facility provides staffing values for community type water supply systems where commercial service is unavailable. This is a support type facility. Staffing values include the workload for maintenance and upkeep of all storage tanks, pumps, valves, filter equipment, treatment systems, pipelines, etc., up to the building cutoff valves. A shallow or deep well with or without a pressure tank or a cistern-type water system without a treatment system does NOT qualify as a WSM regardless of type facilities served. All plumbing equipment workload in the facility, including the cutoff valves, is included in the facility allowance; i.e., environmental support.

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✍ Please note your current position and geographic location.

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